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Rulings Pave Way For March Trial In Conspiracy Case

MADISON, WIS., Jan. 11.—The government's "oil conspiracy" cases were the topic of discussion for three days in federal court here last week, but there was evidently no oil on the springs of Judge Patrick T. Stone's chair.

For the first time since preliminary arguments on the cases began last August, Judge Stone seemed to relax physically while listening to the pleas of counsel for the government and the defense, but there was evidently no mental let-down. The gentle squeak of the springs made a monotonous undercurrent to the bland voice of Col. William J. Donovan, of New York, chief of counsel for most of the defendant oil companies, to the more deliberate statements of H. H. Thomas, Madison, white-thatched local counsel for the defendant companies, and to the much more vigorous remarks and gestures of John Henry Lewin, Washington, of counsel for the government.

Judge Halts Arguments

Every now and then the steady squeak of the judicial chair would stop, and Judge Stone would cut through the arguments of counsel with a few incisive words, indicating what his stand would be on the question, or remarking that he was familiar with the law being cited. It was evident that Judge Stone had spent the Christmas holidays ploughing through a heavy course of legal reading on questions raised in December by the defense.

The morning of Jan. 8, after two days of arguments, the squeaking chair stopped frequently and Judge Stone made these rulings, which had the effect of clearing the track for actual trial of the cases some time in March:

Sustains Government's Demurrer

He sustained the government's demurrer to the plea in abatement to quash the indictments of the first grand jury, made by Col Donovan at the Dec 7 session of the court and struck from the record Col. Donovan's demurrer to the government demurrer.

The court indicated in vigorous language that it would probably deny defense petitions, filed Jan. 8, asking that witnesses before both grand juries be relieved of their oath of secrecy, and that all papers and documents subpoenaed from the defendants for use before the first grand jury be unconditionally returned to the defendants Briefs on the two questions are to be filed, and further arguments will be heard Feb. 1.

Judge Stone summarily denied a motion of William A. Daughterty, Janesville, Wis., former U. S. District attorney for the eastern district of Wisconsin, and now counsel for a group of oil companies not represented by Col. Donovan, for a complete transcript of the grand jury testimony.

Order is Withdrawn

The court permitted Thomas to withdraw the "order to show cause" obtained Dec. 21 which would have prevented the government from using before the second grand jury any documents of information gleaned from them which had been presented to the first grand jury. The order, returnable Jan. 7, was obtained while, in fact, the second batch of indictments was being printed. Conceding that further argument was pointless, Thomas asked leave to file an amended petition on behalf of the individuals instead of the corporate defendants. This also will be argued Feb. 1.

At the request of government counsel, the court ordered the 17 individual defendants who had waived removal hearings under the July 28 indictment to appear in Madison Feb. 1 to be arraigned in person. Removal hearings for the others are scheduled to start in New York Jan. 14. "It doesn't seem fair to these defendants who've been good enough sports to waive removal, but if you insist, they will be ordered to appear," Judge Stone said. "I see no reason for treating these defendants in any other than the usual manner."

The court also extended to

(*Continued on page* 18)

OIL BILLS LOOM IMPORTANT AS LEGISLATURES CONVENE

By Teletype
N. P. N. News Bureau

WASHINGTON, Jan. 12.—A surprisingly large number of bills affecting the oil industry have bobbed up not only in Congress, which has been in session just a week today, but also in state legislatures now in session.

In Congress, bills for controlling stream pollution were in the forefront, with Senator Lonergan, Conn., reintroducing his measures for federal regulation. Congressman Spence, Kentucky, came forward with a pollution bill covering the Ohio river system, and Senator Barkley, Kentucky, late this afternoon introduced a bill (S. 702) which lacks the federal control features of the Lonergan bills.

Barkley's bill would lend federal encouragement, through a division of water pollution control in the public health service, to uniform state legislation on pollution and interstate compacts. It would make available funds for federal loans and grants to states, municipalities or industries to take pollution control steps.

Doubling the present 21-cent per barrel oil tariff and levying a new excise tax on imported asphalt is proposed by Congressman Sanders, Texas.

Congressman Dempsey, New Mexico, has put in a bill authorizing a survey of crude oil stocks by the U. S. Bureau of Mines, and appropriating $15,000 a year to keep it up to date. The bureau is now engaged in such a survey but will welcome the annual appropriation.

Jurisdiction over appeals from assessments under the federal gasoline and lubricating oil taxes would be given to the U. S. Board of Tax Appeals under a bill by Congressman Vinson, Georgia.

Congressman Burdick, North Dakota, proposes a $120,000,000 fund for loans to farmers, with specific provision that some of the money can be used

(*Continued on page* 20)

Thank Oil and The Smudge Pots For That Cal. Breakfast Orange

N. P. N. News Bureau

LOS ANGELES, Jan. 8.—Orchard owners of southern California burned over 32,000,000 gallons of fuel oil daily, during most of the week, in an effort to protect the state's second greatest industry from the menace of frost.

In a concerted group action, 16,000 citrus growers fired more than 5,000,000 heaters daily from 7 p. m. to 8:30 a. m. Thousands of men patrolled the orchards, lighting, regulating and refilling the heaters, while almost as many women served behind the lines, preparing hot food and drink.

This was the longest and most severe cold spell on the Pacific Coast in 15 years and federal weather forecasters predicted continued low temperatures that might break all records.

Early in the week, fuel oil stocks of many ranchers were exhausted and heavy drains were made on bulk storage plants maintained by orchard supply firms in the citrus districts of Orange and Riverside counties. A large percentage of smudging oil is furnished under contract by independent refiners with plants in Los Angeles Basin at a price considerably lower than the prices posted by major companies. By the close of the week, these independent supplies were almost exhausted and major companies were supplementing them. All available means of transportation were called into service by California refiners and marketers. In addition to the regular facilities for handling this product, trucks ordinarily used for gasoline distribution were converted into fuel oil carriers.

Rulings Pave Way For March Trial

(*Continued from page* 17)

Feb. 1 the time for arraignment of all the corporate defendants named in the two indictments returned Dec. 23. An attorney for the Mid-Continent Petroleum Corp., however, objected to inclusion in the general order, and said that his company wished to be arraigned earlier, which the court permitted.

Both Col. Donovan and Mr. Thomas, in demanding the unconditional return of the impounded documents of the oil companies as a "fundamental right", said the lack of the documents was depriving the defense of an adequate opportunity to prepare for trial.

Ask Impounded Documents

I'd say off-hand that the request seems reasonable," Judge Stone replied. "They should have every access to the files to prepare their defense. What do you think?" said the court, turning to Lewin.

"We agree," Lewin replied. "We have always realized that complete access to the documents should be accorded. The first order of May 21, 1936, provided for this, and the defendants and their counsel have availed themselves of it all through the summer and fall and down to date."

Lewin then revealed a conversation in Washington last August between the defense counsel and attorney general's staff, at which, he asserted, Donovan had suggested a plan under which the defense would obtain the documents under promise of returning them 30 days before the trial. He said the government prepared a court order to this effect, but that the defense rejected it at a further conference in Madison Oct. 21. Lewin said the documents contained highly valuable evidence, and that he feared they might be lost or hopelessly jumbled if they were not released under promise of return in the original containers.

To Ask New Order

A hint that the government may proceed to trial on the second set of indictments, instead of the first group returned by the disputed grand jury, was seen when Lewin said he would ask the court for a new impounding order to preserve the documents "for trial on the second indictments."

"I had hoped to avoid troubling your honor in this matter, and wanted to settle it in conversations with government counsel," Donovan replied in his blandest manner. "I prefer to believe that government counsel has not heard all the conversation. But since part of the story has been told, I had better tell *all* the story."

Donovan's Version

Donovan then said that he had made the "offer" cited by Lewin merely to open the conversations. "The defense is entitled to the unconditional return of the documents, and they can't be impounded merely for the convenience of government counsel," he said.

The judicial chair squeaking stopped abruptly, and Judge Stone leaned forward. "It is very apparent to this court that it is essential that the evidence be preserved for trial," he said. "The government offer seems very fair to both parties, and I would be inclined to sign such an offer." Stating that he wanted to read the law on the question first, before giving a final ruling, the judge continued, "I'm satisfied the necessities of the case require the impounding of these documents."

"But these are responsible people, your honor," interjected Mr. Thomas. "They aren't just a bunch of bootleggers. We want these documents in order to prepare for trial."

After some further argument, Judge Stone turned to Col. Donovan and asked him if he did not wish to apply to the court for an order such as that outlined by government counsel.

Government Not to Apply

"No," Donovan said curtly. "Let government counsel apply for the order, and then we can argue it."

"They have some curious reluctance to apply to the court for this order," Lewin said gleefully. "The government is not going to apply. I'm satisfied with the present position."

"It's very evident what counsel has in mind," Donovan retorted angrily.

Lewin leaped from his chair at this, and shouted at Donovan: "I don't care what slurs Col. Donovan may make against me. That's our position."

"I wasn't making any slur, I was making a statement," Donovan replied.

The two attorneys began shouting at each other at the same time, until Judge Stone's vigorous gavelling brought them to order.

The "Oath of Secrecy"

The next matter to come up was Col. Donovan's petition to release witnesses before both grand juries from their oaths of secrecy, "so that counsel can see whether there were any gross irregularities before the grand jury." Donovan said he could see no reason for continuing the oath of secrecy, now that the indictments had been returned.

"There's only one reason, and you know it as well as I do," Judge Stone retorted pointedly. "The proceedings before a grand jury are absolutely secret, and you have no right to try to worm out of them what their testimony was."

Thomas then cited an imaginary "John Smith," and the difficulty of defense counsel in getting him to talk.

"I'm not quite sure of the rights of witnesses, and I want to study the citations before taking a position," Lewin said. "There is no attempt to sequester the facts. This petition, however, seeks to open up the proceedings of the grand jury. I don't believe they're entitled to do that."

Involuntary Testimony Immune

The court: "My impression is that I'm not going to let anybody walk in the back door of the jury room when the front door is closed. I'm not making a ruling yet, but right now I'd say that I'm not going to permit questioning on what went on in the jury room."

"There is an immunity provision in the Sherman anti-trust act (under which the oil cases are brought) for all who testify involuntarily," Col. Donovan reminded the court.

"You're attempting to do something indirectly that you can't do directly," Judge Stone replied.

"But lots of our witnesses absolutely won't talk to us," complained Donovan. "Some of these witnesses were brought before your honor—and they're scared to death."

The court made no comment.

Transcript Asked For

Atty. Daugherty then appeared, and said that, when he was U. S. district attorney for the eastern district of Wisconsin, he had felt that the defense was entitled to a complete transcript of the grand jury testimony.

"Did you ever give such a transcript to a defendant when you were district attorney?" Judge Stone asked with a smile.

"It was never asked for," said Daugherty. He then formally moved for a transcript of all the testimony.

"That motion is denied," Judge Stone said promptly. "You have the indictments, and you can question the witnesses well enough to prepare for the trial."

Col. Donovan then rose to say that the defendants he represented did not join in Daugherty's motion. "We're not trying to get into the back door, we say the front door is open," Donovan said.

Judge Stone then gave his oral ruling on the plea in abatement. "This is my rough view on the demurrer to the plea in abatement," he said. "It has occurred to me all along, while thinking of the ruling, that there has been no showing of prejudice aside from the return of the indictments. The defense must go farther, and show by preponderance of the evidence that he might not have been indicted. The defense shows no facts which would indicate prejudice. The names of the grand jurors were selected by authorized representatives of this court, in a manner that I think was proper. It is true the names were not placed in the box in the manner authorized by the statutes, but Mr. Hale (Herbert C. Hale, clerk of the court) and Mr. Sumner (jury commissioner) both placed names in the box, and the presumption is that both complied with the law. My view is that Mr. Sumner ratified the actions taken by Mr. Hale. At most it is a mere irregularity. The court will sustain the government demurrer."

Reported Ehringhaus Will Handle Oil Cases

By Teletype
N. P. N. News Bureau

WASHINGTON, Jan. 12. — Commenting on reports that former Governor Ehringhaus, of North Carolina, will be named a special assistant U. S. attorney general to handle prosecution of oil cases at Madison, officials of the Justice Department today insisted the "matter is still under consideration."

Ehringhaus' term as governor expired last week. His friends here say that he conferred recently with Attorney General Cummings about the appointment. They do not recall that Ehringhaus has had any particular experience in handling anti-trust matters.

John Dickinson is quitting Jan. 20 as assistant attorney general in charge of Justice Department's anti-trust division, to become solicitor for the Pennsylvania Railroad, with offices in Philadelphia.

The Department of Justice has a special appropriation for hiring outside lawyers to handle important cases. If Ehringhaus s retained to conduct trial of the oil anti-trust cases at Madison, he would be paid from this fund.

Oil's Waste Is Included In Stream Pollution Bill

N. P. N. News Bureau

WASHINGTON, Jan. 11.—First among the legislative proposals affecting the oil industry to come before Congress probably will be bills to control pollution of streams.

Sponsors of anti-pollution bills are for the most part organizations like the Izaak Walton League and others interested in wild animal life and a few state health officials who are not averse to having the federal government take over pollution control.

They are doing quiet but effective organization work on Capitol Hill, so that, when these bills come up, they hope to have considerable support.

Senator Lonergan, Connecticut, who has reintroduced his pollution bills, is their leader. He is conferring almost daily with sportsmen's organizations and health officials. By negotiating with hostile state officials and representatives of industries affected, Lonergan hopes to quiet their fears of the proposed legislation.

In view of the six days of testimony taken last year on similar bills, Lonergan may try to have the Senate Commerce Committee favorably report his bills without holding further hearings.

One of the Lonergan bills (S. 15) would amend a sectioin of the act of March 3, 1899, relating to deposit of refuse in navigable waters, by including as pollution, "sludge, corrosive substances, and sewage from which the bulk of the suspended and floating matter has not been removed and sewage in a liquid state as well as other matter."

Is Of Wide Scope

This bill, which is similar to S. 3959 at the last Congress, would also amend the oil pollution act of 1924 to include tributaries of navigable waters where the "pollution" is "liable to be washed into such waters, either by ordinary or high tides, or by storms or floods or otherwise, from the shore, or any wharf, refinery, manufacturing establishment, or mill of any kind . . . . "

The other Lonergan measure (S. 13) corresponds to his bill (S. 3958) last year. It would establish the National Resources Committee, of which Secretary Ickes is chairman, as a permanent agency in charge of federal pollution control of navigable waters "and their tributaries."

The committee would have power to divide the country into sanitary water districts and fix "standards of purity" for the navigable waters and their tributaries. The committee would also be directed to establish minimum requirements as to treatment of polluting material before it is discharged into such waters.

In each district a board would be set up to administer the law and institute proceedings for the "prevention and abatement" of water pollution.

The bill also provides for research into methods of preventing pollution, through chemical neutralization of refuse from industrial plants or cities along a stream and other methods, as well as for co-operation with state anti-pollution bodies and encouragement by the federal government of state compacts for the prevention of pollution.

Loans Authorized

Although no appropriation is provided for, the measure also would authorize the Natural Resources Committee to make loans and grants to states, cities, persons and corporations for construction of sewage disposal plants or works for treatment of "trade wastes."

Proponents of the legislation hold up the latter measure as an attempt at friendly co-operation with industries whose operations entail disposal of waste matter, as well as with cities and states.

For instance, they say, the committee's research division may develop a method for treating the waste from a pulp paper mill. After it is developed, the information would be broadcast to the industry, along with recommendations that they adopt the method.

States would be urged to press upon any paper mills in their bounds the necessity for using the process, and the federal government would extend the lure of a government loan or grant to those mills situated on streams whose "standard of purity" is impaired by the refuse from the mills.

If the mill refuses, at length, to co-operate, them the federal government has at its disposal the clause in the bill which declares such pollution to be a nuisance, and may go into a court of equity and ask for an injunction against the recalcitrant, it is pointed out.

It is the hope of the bill's backers that industries and others affected by it will accept it in a spirit of "co-operation," which they are sure will be the case if they are educated to its aims.

Federal Agencies Against

Strangely enough, Secretary Ickes opposed the Lonergan bill last session, declaring that the National Resources Committee was an advisory and not an administrative agency.

With one of its agencies, the Public Health Service, left out of the picture the Treasury Department also raised objections.

Favored State Compacts

Secretary of Agriculture Wallace didn't think the idea of the National Resources Committee was the proper agency. However, he endorsed the proposal of interstate compacts for pollution control.

Opposition of the War Department was presented in a letter by the late Secretary Dern. He likewise said the National Resources Committee was not a suitable agency, and suggested that such activities might be appropriately carried out by the Public Health Service. He added:

Although some state officials, such as those of Pennsylvania, backed the Lonergan Bill, others opposed it as encroaching on their authority.

The bill, as one pointed out, gives "the federal government jurisdiction over every freshwater stream, large and small, in the country, even down to the smallest rivulet, and that would be such a flagrant violation of states' rights and state authority that it would upset the entire program."

Witnesses testified last year that it would cost cities of the U. S. $1,000,000,000 to comply with the Lonergan bills, besides another three to five billions for changes in industrial plants.

Asks Complete Discount List Rule in Gasoline Pump Code

By Teletype
N. P. N. News Bureau

WASHINGTON, Jan. 12.—Discussion of "open price filing" featured the brief hearing held by the Federal Trade Commission today on the proposed fair trade practice rules for the gasoline pump industry.

A 10-day extension, in which "interested parties" may make suggestions or objections to the proposed trade practice rules for the Gasoline Pump Industry, was granted by Judge George E. McCorkle, director of the FTC's trade practice conference division, on the request of Paul E. Hadlick, secretary of the National Oil Marketers' Association.

Hadlick said that the membership of his organization might not have had time before today's hearing to offer any suggestions or objections they might have.

Only one other witness appeared at the hearing—Thomas J. McFadden, of the law firm of Donovan, Bond and Leisure, representing the Gasoline Pump Manufacturers' Association.

When the record is closed after the 10-day extension, McCorkle's division will go over the code and the suggestions before submitting their recommendations to the commission. However, McCorkle said, it probably will go before the FTC within a short time after the record is closed.

The chief topic of discussion at the hearing was the Group II rule, divided into two parts, providing:

"(a) The industry approves the practice of each individual member of the industry independently publishing and circulating to the purchasing trade his own price lists.

"(b) The industry approves the practice of making the terms of sale a part of all published price schedules."

The Group II rules in all trade practice codes of the FTC are those which are voluntary on the part of the industry; Group I rules are enforcible by law, and are substantially the same for all industries.

As published, the Group II rule quoted above does not provide for an open price, Hadlick told McCorkle and his assistant, Henry Miller, who presided with him. He said it is the practice of most pump manufacturers to send a different price schedule, with different discounts, to prospective purchasers whom they knew to be "25-pump-a-year" purchasers than they would to 10-carload purchasers, or to purchasers of single pumps.

Hadlick suggested that the two divisions of the Group II rule be combined in such a way as to provide that if any prospective purchaser asked for a price list from any pump company, he would be furnished with a complete schedule of discounts, so that he would know what a certain pump costs "if he buys one pump or 10 carloads".

New Bills in Congress

Summary of bills introduced in both the House and Senate which propose legislation of importance to oil companies. The summary includes the number of the bill, the name of the member introducing it, a brief abstract of its contents and the name of the committee to which it has been referred

IN THE HOUSE

HR 88, Sanders, Texas, to extend excise taxes on oil imports, increase to 42 cents a barrel the tax on crude and liquid derivatives of petroleum (except gasoline and lube oils), add a new tax of $2 a ton on imported asphalt and eliminate tax exemptions for ship's supplies; Ways and Means Committee.

HR 159, Snyder, Pa., to provide for a survey by the Bureau of Public Roads of a system of three trans-continental and six north-south highways; House Roads Committee.

HR 205, Burdick, N. D., to appropriate $120,000,000 for feed, power (including gasoline and oil) and seed loans to farmers; House Agriculture Committee.

HR 244, Vinson, Ga., to give U. S. Board of Tax Appeals jurisdiction over cases involving federal gasoline, lubricating oil and other miscellaneous taxes; Ways and Means Committee.

HR 265, Smith, Wash., to set up a Court of Labor Adjustment and Arbitration to handle controversies between employers and employes relating to wages, hours and working conditions; House Judiciary Committee.

HR 1490, Dirksen, Ill., to extend until Jan. 1, 1938, the deadline for states enacting unemployment-compensation laws under the Social Security Act and make available to the states proceeds of federal payroll taxes collected in 1936; Ways and Means Committee.

HR 1606, Connery, Mass., to prevent the shipment in interstate commerce of articles produced by employes working more than 30 hours a week; House Labor Committee.

HR 1611, Miller, Ark., to apply state re-sale price maintenance laws to interstate sales of branded products; House Judiciary Committee.

HR 1626, Dempsey, N. M., to authorize a survey of crude oil stocks in the U. S. House Mines and Mining Committee.

HR 1628, Dirksen, Ill., to prevent the reduction of freight rates from rail-shipment points because of indirect water competition; House Interstate Commerce Committee.

HR 1661, Mapes, Mich., to increase the District of Columbia's gasoline tax from 2 to 4 cents; House District of Columbia Committee.

HR 1667, Meade, N. Y., to require corporations engaged in interstate commerce to take out a federal license and fixing conditions to be met by the licensee; House Judiciary Committee.

HR 1985, Connery, Mass., to apply to goods shipped into a state (regardless of original package laws of that state on working conditions, hours and wages); House Labor Committee.

HR 2015, Vinson, Ky., to regulate the sale and distribution of bituminous coal and set up in the Interior Department a national coal commission; Ways and Means Committee.

HR 2300, Spence, Ky., to provide for a pollution survey by army engineers, in co-operation with the Public Health Service, of the Ohio river and its tributaries; House Rivers and Harbors Committee.

IN THE SENATE

S 1, Guffey, Pa., to regulate the sale and distribution of bituminous coal and set up in the Interior Department a National Coal Commission; Senate Interstate Commerce Committee.

S 10, O'Mahoney, Wyo., to require corporations engaged in interstate commerce to take out a federal license and fixing conditions to be met by the licensee; Senate Judiciary Committee.

S 13, Lonergan, Conn., to empower the National Resources Committee to regulate water pollution through a system of sanitary water districts; Senate Commerce Committee.

S 15, Lonergan, Conn., amending Pollution Act of 1899 and Oil Pollution Act of 1924; Senate Commerce Committee.

S 100, Tydings, Md., to apply state re-sale maintenance laws to interstate sales of branded products; Senate Judiciary Committee.

S 175, Black, Ala., to prevent the shipment in interstate commerce of articles produced by employes working more than 30 hours a week; Senate Labor Committee.

S 330, Hatch, N. M., to convey to homesteaders gas and oil rights reserved by the U. S.; Senate Public Lands Committee.

S 363, Nye, N. Dakota, to authorize the Federal Trade Commission to approve agreements for "reasonable" regulation of competition; Senate Finance Committee.

S 414, Nye, N. Dakota, and King, Utah, to authorize specifically the Federal Trade Commission to hold trade practice conferences and approve agreements for elimination of unfair competition; Senate Interstate Commerce Committee.

S 447, Gibson, Vt., to ban sale in the District of Columbia of motor vehicles built after March 1, 1937, not meeting standards approved by army engineers; Senate District of Columbia Committee.

S 589, Truman, Mo., to require a federally-approved license for operating motor vehicles in interstate traffic; Senate Interstate Commerce Committee.

Oil Bills Loom Important

(*Continued from page* 17)

for the purchase of gasoline and lubricating oils.

Under a measure sponsored by Senator Truman, Missouri, anyone who drives an automobile or truck in interstate commerce would be required to hold a federally recognized and approved driver's permit.

Congressman Mapes, Michigan, proposes to increase the District of Columbia gasoline tax from two to four cents.

Other bills include proposals for aid to state highway patrols, surveys for transcontinental highways, resale price-maintenance laws, approval of voluntary industrial agreements for regulating competition, a compulsory 30-hour week, licensing of interstate corporations, regulation of the coal industry, and scores of constitutional amendment proposals and new schemes for regulating industry.

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States Eyeing Oil As 'Public Utility'

By Teletype
N. P. N. News Bureau

WASHINGTON, Jan. 12.—New threats to regulate strictly the sale of gasoline as a "public utility" have cropped up in several states as the first of the 43 state legislatures meeting this year opened their sessions, according to word received here.

An appropriation to build a state-owned oil terminal in North Carolina, unless the state is able to continue buying its gasoline at "fair" prices was suggested to the state legislature, along with proposals to limit the number of filling stations by a licensing system and set up state specifications for several grades of gasoline.

Tightening of North Carolina's anti trust laws against "monopolies and price fixing" was also suggested in the report of a special commission investigating the oil industry of that state.

Chairman Ehrlich, of the New York legislative committee investigating gasoline prices has indicated that his committee may also sponsor a bill for grading of gasoline according to definite specifications.

Governor Ayers, of Montana, recommended making gasoline a "public utility" in his message to the legislature of that state.

To the Rhode Island legislature, the suggestion was made that the state public utility division be given the power to fix gasoline prices. Governor Quinn, in his message, stated "in my opinion large companies have unjustly taken millions of dollars out of the pockets of the Rhode Island public."

Pennsylvania's Governor Earle also recommended a public utility status for oil. In his opening message, he told the legislature that it has power to provide justice at last for the consumers and rate payers "who have suffered from monopolistic practices of public utilities." Continuing, he said:

"I favor appointment of a committee to study the question of monopolistic practices in the gasoline and oil industry, particularly price wars and price fixing. My recommendation is that your honorable body consider the feasibility of including, under public utility regulations, all natural and manufactured gas, gasoline and oil and possibly coal.

"However, I might suggest that you delay final decision on this point until after the committee studying the 'bootleg' coal problem and the gasoline and oil industries present their reports, particularly since these industries are vital not only to the state but to the nation as well."

Senator Baldwin, chairman of the Michigan legislative committee which held hearings and conducted an extensive investigation of oil marketing conditions, has filed with the legislature the report of his committee. Among other things, the report recommends establishment of an agency, patterned after the Federal Trade Commission, to enforce a state fair trade practice law.

N.O.M.A. Fights Extension Of Connally "Hot" Oil Law

N. P. N. News Bureau

WASHINGTON, Jan. 12.—A determined drive to block extension of the Connally "hot" oil law was launched today by Paul E. Hadlick, secretary of the National Oil Marketers Assn., in a follow-up of resolutions adopted at the recent NOMA convention in Chicago.

Although the Connally law, prohibiting the shipment in interstate commerce of oil produced in violation of state laws, is strongly backed, the type of campaign planned by Hadlick may stir up opposition. Unless extended, the law expires June 16.

Hadlick is printing 20,000 copies—and is prepared to print tens of thousands more—of a pamphlet entitled "Conservation for Whom?" for distribution throughout the U. S. The first batch is being mailed out today.

The NOMA pamphlet attempts to show that the Connally law is contrary to interests of the consuming public and the independent oil marketer.

Senator Tom Connally, of Texas, will introduce this week a resolution permanently extending the law which bears his name.

Law Strongly Supported

Backing the Connally law are the American Petroleum Institute, Secretary of Interior Ickes, the Independent Petroleum Association of America, the Interstate Oil Compact Commission, and the American Bar Association's mineral law division.

Col. E. O. Thompson, who is chairman of both the Texas Railroad Commission and the oil compact commission, called at the White House Jan. 8 to urge that President Roosevelt ask Congress to extend the Connally law and the Cole resolution (expiring Sept. 1) which gives federal approval to the oil compact.

Conference "Satisfactory"

The President, according to Thompson, was much interested in his recital of the oil compact's accomplishments. Thompson declined to reveal what the President said, but he did say the conference was "satisfactory".

It is against this formidable opposition that Hadlick intends to break a lance; several lances, in fact.

Both the Connally law and the Cole resolution drew fire from Hadlick in his NOMA pamphlet.

At Expense of Jobbers

The Connally law, said Hadlick, has "placed the federal government in the business of aiding the major integrated oil companies, the producers of crude oil and the oil-producing states in curtailing the production of crude oil below market demand, thus holding the price above ordinary competitive levels and exacting tribute at the expense of the public and independent oil marketers."

The oil compact, approved by the Cole resolution, has also operated to give the oil-producing states a "leverage to raise the price," Hadlick charged.

Issuance of monthly forecasts by the U. S. Bureau of Mines of market demand for crude and refined products is also attacked in the NOMA pamphlet.

These forecasts constitute the third link in the chain of federal aid to oil monopoly," said Hadlick, in urging Congress to enact a law forbidding the Bureau of Mines to issue such forecasts.

In the pamphlet Hadlick asks who were the proponents of these laws, and answers by saying, "They included the major integrated oil companies, the oil producers and the oil-producing states. The beneficiaries are the same group.

Who Pays the Bill?

"Who pays the bill? The public and the independent oil marketers in the majority of the states that do not produce oil," the NOMA pamphlet continues.

"Both laws were sponsored and their enactment urged by groups that expected to and now do benefit from their passage. They enable these groups to hold production of crude oil below market demand and thus exact a higher price than competition would otherwise provide and, through control of the supply of petroleum products, to 'squeeze' the independent marketer out of business.

"These laws aid in artificially limiting the amount of crude oil that may be produced, thereby placing an excessive financial burden on individual and commercial consumers of fuel oil, gasoline and lubricating oil, thus increasing the cost of manufacturing and living.

"This favoring of the production end of the oil business with positive control, aided by the federal government, has forced the independent marketing branch of the oil industry to buy at these regulated and controlled prices and yet to sell on an open competitive market; competing with the integrated oil companies who sometimes market at a loss and use their production, pipeline and refining profits to absorb that loss," it was stated.

May Oppose Imports Tax

There was also a hint in the pamphlet that the NOMA will oppose extension of the excise taxes on oil imports (due to expire in June), to be found in Hadlick's contention that these laws, "ostensibly" for conservation, are in conflict with the so-called oil tariff on petroleum products imported from foreign countries.

Attention is called to "shocking revelations" by the federal grand jury at Madison, Wis., which has indicted a number of oil companies and individuals. This indicates, said Hadlick, the necessity of an adequate appropriation for anti-trust law enforcement.

The NOMA pamphlet concludes with the suggestion that Congress divorce pipelines and tankers from the oil companies.

Tax On Imported Crude, Fuel Oil Doubled in Bill

N. P. N. News Bureau

WASHINGTON, Jan. 11.—The loophole in the so-called oil tariff, permitting duty-free importation of fuel oil for supplying vessels, just won't stay plugged.

Reversing an earlier decision, the New York customs court has held that oil for supplying any vessel, whether of American or foreign registry, can be imported free from tax.

Meanwhile, Congressman Sanders, of Texas, has introduced a bill (HR 88) to make permanent the excise taxes on oil imports, which are due to expire in June, and wipe out tax exemptions for vessels' supplies. It was referred to the Ways and Means Committee.

Besides this, the Sanders bill proposes to increase from 21 to 42 cents a barrel the excise tax on imports of crude, fuel oil and other liquid derivatives of petroleum (except gasoline and lubricating oil). The tax on imports of gasoline, 2.5 cents a gallon, and of lubricating oil, 4 cents a gallon, would be left unchanged. A nex tax of $2 per ton would be levied on imported asphalt.

The effort to increase the tax on imported oil is one which bobs up frequently. Most recent previous attempt was in the last edition of the Disney oil control bill introduced in the last Congress about a year ago. Taxes suggested in the Disney bill were identical with those now proposed.

The present excise taxes on oil imports are to be found in Section 601 (c) (4) of the revenue act of 1932. Originally, the taxes applied to all oil imports without exception. By the act of June 16, 1933, (not the NIRA, which was approved the same day) an amendment, Sec. 630, was tacked on.

Exempt By Amendment

This amendment exempted from the excise taxes oil imported as fuel supplies or ship stores on ". . . . vessels of war of the U. S. or of any foreign nation, vessels employed in the fisheries or in the whaling business, or actually engaged in foreign trade or trade between the Atlantic and Pacific ports of the U. S. or between the U. S. and any of its possessions."

In a decision dated Oct. 7, 1936, the New York customs court, with Justice Brown dissenting, construed this amendment to mean that, except for vessels of war, oil imported for any other foreign vessel was subjected to tax. However, the court admitted that it had difficulty in understanding the intent of Congress in the 1933 amendment exempting ships' supplies.

Barred Foreign Ships

Effect of this decision was to hold that American-flag vessels could buy imported fuel oil free from the 21-cent excise tax, but foreign-flag vessels could not.

A request for a rehearing of the case was granted on grounds that a review of the matter "showed unmistakably the Congressional intent to exempt fuel supplies . . . . regardless of nationality or registry, engaged in foreign trade, from the excise taxes on oil imports."

The court pointed out that the evident motive of Congress was to encourage, by the tax-exemption amendment, foreign-flag vessels to purchase their supplies of fuel oil at American ports, instead of bunkering abroad for a round-trip.

The customs court's original decision in October (T. D. 48579), and its reversal of that decision in an opinion a few days ago (T. D. 48733), was handed down in the case of *Guy B. Barham Co. vs. U. S.*

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Most Pressing at Washington

Legislative proposals having to do with stream pollution in this country right now loom as the most important issue at Washington before the oil industry; largely because of the pressure being exerted to push through Congress arbitrary legislation to put the handling of water pollution entirely in the hands of the federal authorities, without giving oil and all interests concerned a chance to place their views on this problem before Congress and the public.

Typical of the arbitrary, all-embrasive type of legislation this administration is seeking in many cases, the Lonergan bill would divide the country into 12 districts, as far as pollution of streams by waste is concerned, and give federal agents the authority to prescribe the minimum percentage of waste which streams and waters would be permitted to carry. Not only would navigable streams come under the jurisdiction of the new federal agency, but also waters feeding navigable streams, which means practically every creek and river in the land. The administration of this new federal agency would be in the hands of the National Resources Committee, an agency of this administration of which Secretary Ickes is chairman.

The disposal of waste is no new problem in this country; it is not nation-wide in scope and it is not uniform in its nature. The problem cannot be solved with arbitrary regulations by inexperienced agencies. If industries are to continue to operate, oil as well as others, and cities and towns are to maintain their present high sanitary standards, their waste must be carried away through streams. No other general means of meeting this problem has yet been found. The problem as to the extent of waste disposal permissible in streams and the question as to whether or not arbitrary restrictions on waste disposal would bring hardships on the community out of proportion to the benefits to be achieved, is distinctly one for the community to solve; or where the waters of more than one state are involved, by an interstate compact or agreement among the particular states concerned.

Industry generally and health authorities of many cities have done a great deal already in solving the problem of waste disposal. The refining industry particularly has done a great deal to eliminate objectionable features of plant operations and it is possible that a good part of the waste along beaches on the seacoast which is now charged to refining plants is due to the cleaning out of bunkers of ships at some distance offshore.

There is no emergency in connection with legislation on this subject. Ample time should be given for industry to present its side of this issue and for Congress to make a study of the need for legislation. Oil men everywhere should make their position known on this matter. The arbitrary restriction of the disposal of salt water in oil fields could reduce production and materially increase the cost of petroleum products to the public.

Lawlessness of Labor

Perhaps the outstanding feature of the labor situation since Roosevelt came into office with his "more abundant life" has been the lawlessness of the labor unions. The country is being given an example of it now in the "sit down" strike of General Motors, where the Lewis labor leaders have seized possession of some of the company's plants and refuse to give them up until the company agrees to certain terms. The highwayman on the road refuses to put down his gun until the victim has given up his watch and his pocketbook.

We have heard much the last four years of the "rights" of labor, of "collective bargaining," of employers who are loudly condemned for every little alleged violation of the law but the administration both at Washington, at state capitols and in city halls has been cowardly silent when union labor, with the seeming frank approval of its leaders, seizes property, or by physical force and violence prevents others from going to work.

The oil industry cannot help but view the situation at General Motors with alarm because one of the Lewis' unions —the oil fields and refinery workers—is undertaking organization of the oil industry. The oil industry is perfectly justified in wondering if it is only a question of time when it will be confronted with the same unlawful mob and highwayman like tactics?

Oil's Fine Record in 1936

The oil industry, big companies and little ones, has made a record greatly to be proud of in aiding recovery, according to statements just made by President Byles and Executive Vice President Boyd of the American Petroleum Institute.

Despite attacks from many quarters with more taxes and chain store legislation, the industry has increased its payroll by 200,000 persons since the low of the depression, bringing the total of employes now to more than 1,000,000. It has reduced working hours more than 30 per cent with wages still higher in purchasing power than in 1929. The industry's payroll this past 1936 was more than $1,500,000,000 and its purchases of supplies and equipment more than $1,000,000,000, in addition to its crude oil purchases of a similar amount.

This is the industry which a quarrelsome critic in the administration announced on the death of the late oil code, would go to pot without his fumbling and directing hand upon it.

High Spots of Next Week's Meetings

Coming Meetings

Northwest Petroleum Association, North Dakota division, Patterson Hotel, Bismarck, Jan. 18, 19.

Oil Trades Assn. of New York, N. Y., Waldorf-Astoria Hotel, Jan. 19.

Northwest Petroleum Association, Minnesota division, West Hotel, Minneapolis, Jan. 21, 22.

Associated Motor Carriers of Oklahoma, annual convention, Oklahoma City, Okla., Jan. 25 and 26.

South Dakota Independent Oil Men's Assn., Cataract Hotel, Sioux Falls, S. Dak., Jan. 26, 27 and 28.

Kentucky Petroleum Marketers Association, Brown Hotel, Louisville, Ky., Feb. 8, 9, 10.

American Institute of Mining & Metallurgical Engineers, New York, N. Y., Feb. 15 to 19.

Kansas City Oil Men's Assn., Broadview Hotel, Wichita, Kansas, Feb. 15 and 16.

Illinois Petroleum Marketers Association, Hotel Pere Marquette, Peoria, Ill., Feb. 17 and 18.

Ohio Petroleum Marketers Association, Hotel Deshler-Wallick, Columbus, Ohio, Feb. 23, 24 and 25.

Wisconsin Petroleum Association, annual convention and equipment show, Plankinton Hotel, Milwaukee, Wis., Feb. 23, 24 and 25.

Iowa Petroleum Association, Des Moines, Iowa, Feb. 24 and 25.

Association of Highway Officials of No. Atlantic States, 13th annual convention, Hotel Pennsylvania, New York, Feb. 24, 25, 26.

American Society for Testing Materials, 1937 Regional Meeting and Committee Week, Palmer House, Chicago, Ill., March 1 to 5.

Indiana Independent Petroleum Assn., Hotel Severin, Indianapolis, Ind., March 10 and 11.

Interstate Oil Compact Commission Meeting, Oklahoma City, Okla., March 12.

National Oil Burner and Air Conditioning Exposition, Commercial Museum, Philadelphia, Pa., March 15 to 19.

American Association of Petroleum Geologists, Biltmore Hotel, Los Angeles, Calif., March 17, 18, 19.

American Institute of Mining & Metallurgical Engineers, Open Hearth Conference, Birmingham, Ala., April 7 to 9.

Petroleum Industry Electrical Association, Shreveport, La., April 8 to 10.

American Petroleum Institute, Division of Production, Pacific Coast District, Biltmore Hotel, Los Angeles, Calif., April 13.

National Petroleum Association, 34th semi-annual meeting, Cleveland Hotel, Cleveland, Ohio, April 15 and 16.

Oil Equipment & Engineering Exposition, Houston, Texas, April 19 to 24.

Western Petroleum Refiners Association, Silver Anniversary Convention, Arlington Hotel, Hot Springs, Ark., April 26, 27 and 28.

Natural Gasoline Association of America, Hotel Tulsa, Tulsa, Okla., April 28, 29 and 30.

American Petroleum Institute, Division of Production, Eastern District, Deshler-Wallick Hotel, Columbus, Ohio, May 6 and 7.

American Gas Assn., Natural Gas Dept., Kansas City, Mo., Week of May 10th.

Second World Petroleum Congress, during International Exposition, Paris, France, late in May or early in June.

American Petroleum Institute, Mid-Year Meeting, Broadmoor Hotel, Colorado Springs, Colo., June 1, 2, 3.

Northwest Petroleum Assn., North Dakota division, Patterson Hotel, Bismarck, N. D., Jan. 18, 19.

January 18, 1:30 p.m.:

Iowa Plan—Why the Iowa Plan Was Adopted, by E. L. Barringer, NATIONAL PETROLEUM NEWS, Chicago News Bureau.

January 19:

Service Stations — Two Kinds of Service Stations, by F. T. Merrill, president, The Union National Bank, Minot, N. D., 10 a.m.

Hypoid Gears — Lubrication Requirements for 1937 Rear Axles and Transmissions, by G. C. Mather, Frank Harris Floyd, Inc., Detroit, 1:30 p.m.

Diesel Engine Fuels and Lubricants — A Diesel Engine Manufacturer's Viewpoint of Diesel Engine Fuels and Lubricants, by G. E. Spain, Caterpillar Tractor Co., Peoria, Ill., 1:30 p.m.

Merchandising—Jobbers Opportunity in Merchandising, by G. Denny Moore, Gasoline Pump Manufacturers Assn., New York, 1:30 p.m.

Northwest Petroleum Assn., Minnesota division, West Hotel, Minneapolis, Jan. 21, 22.

* * *

January 21, 1:30 p.m.:

Iowa Plan—Why the Iowa Plan Was Adopted, by E. L. Barringer, NATIONAL PETROLEUM NEWS, Chicago News Bureau.

January 22:

Taxation, by P. J. Schroeder, chairman, Minnesota Petroleum Industries Committee, American Petroleum Institute, 10 a.m.

Hypoid Gears — Lubrication Requirements for 1937 Rear Axles and Transmissions, by G. C. Mather, Frank Harris Floyd, Inc., Detroit, 1:30 p.m.

Diesel Engine Fuels — A Diesel Engine Manufacturer's Viewpoint of Diesel Engine Fuels and Lubricants, by G. E. Spain, Caterpillar Tractor Co., Peoria, Ill., 1:30 p.m.

Merchandising — A Jobbers Opportunity in Merchandising, by G. Denny Moore, Gasoline Pump Manufacturers Assn., New York, 1:30 p.m.

False Advertising Claimed

N. P. N. News Bureau

WASHINGTON, Jan. 11.—Alleged claims that "Koatsal," a motor lubricant, provides "perfect protection against burned-out bearings," and that an automobile conditioned with the product "and having no oil in the crankcase can run an amazing distance without damage" have drawn a Federal Trade Commission complaint against Kidder Oil Co., LaCrosse, Wis.

FTC says the alleged claims constitute "false and misleading representations," in violation of Sec. 5 of the FTC act.

The company was given 20 days to file an answer.

Contents

NEWS

Oil Bills Loom Important as Legislatures Convene 17
Rulings Pave Way for March Trial In Conspiracy Case..... 17
Oil's Waste is Included In Stream Pollution Bill 19
Asks Complete Discount List Rule in Gasoline Pump Code..... 19
N. O. M. A. Fights Extension of Connally "Hot" Oil Law 21
Tax on Imported Crude, Fuel Oil Doubled in Bill 21
Editorials 22
Bill Allows State to Develop Tideland Field in California..... 26
Institute Group to Study Oil Well Spacing Practice 26
Oil Well Spacing Case Again Filed in Highest Court 27
Bill to Grade Motor Fuels Is Talked for N. Y. State 28
April 1 is Date for Unionization of Oil Industry 29
State Owned Terminal Urged to Safeguard "Fair" Prices 30
$1,000,000 a Year Cost to Tenn. of Poor 'Gas' Tax Collections 32
Dealers Organize Service Institute 32
Plant Operators Discuss Tube Cleaning Problems 32-A
Gasoline Tank Car Bids Range From 4.375 to 11.71 Cents 32-C

MARKETS

Mid-Continent 33
Chicago 34
Coastal 34
Wax 34
Pennsylvania 34
Eastern 35
California 35
Fuel Oil 35
Refinery Tank Car Markets 36, 37, 38
Tank Wagon, Service Station Markets 39, 40, 41
Seaboard Markets....42, 43
Crude Oil Markets ...44, 45

AUTOMOTIVE LUBRICATION

Lubricating the 1937 Automobiles 50
Buick 52
Cadillac-LaSalle 54
Chevrolet 56
Chrysler-DeSoto 58
Ford-Lincoln-Zephyr.. 60
Graham 67
Hudson-Terraplane... 68
Nash-LaFayette 72
Oldsmobile 73
Packard 74
Plymouth-Dodge 76
Pontiac 78
Studebaker 80
Willys 81
Thar's Gold, Pardner, in Them Thar Front Wheel Bearings 84
The Automotive Engineer Looks At Lubrication *by L. K. Marshall* 92
"Use Hypoid Lubes for Hypoid Axles" Is Best Servicing Rule 100
Making the Dealer "Lubrication Conscious"..106
1937 Passenger Car Capacity Chart.....114, 115
Safety Precautions Must Be Observed In Servicing Hypoid Gears...116
Gasoline and Oil Saving Devices Used on Many New Models.....122
Why Hypoid Gears Are Used 127
A Lubrication Engineer Checks the 1937 Cars.132
Recognizing the Air Cleaner As a Profitable Service Item....137
Compression Ratios of 1937 Cars Average 6.29 to 1.....140
Every Second Car Is a Ford or "Chevvie"....141
Selling at Stations 144
New Equipment 145

TECHNICAL

Huge Quantities of Chemicals Used by Oil Industry 149
Viscosity Conversion Charts *by Richard Grosholtz* 151
Butane Used As Refrigerant in Home Air Conditioning Installation 157

DEPARTMENTS

Washington from the Crown Block 25
Mid-Continent Skyline.. 27
The Midwest Marketer. 31
Automotive Notes and Comments 48
New Equipment 145
New Refining Patents..159

Index to Advertisers

This index is published as a convenience to the reader. Every care is taken to make it accurate, but National Petroleum News assumes no responsibility for errors or omissions

Ace Engineering Co. 88
American Can Co. 62-63
American Flange & Mfg. Co. 8
American Oil & Grease Corp. 121
American Weekly, The 65

Battenfeld Grease & Oil Corp. 57
Bayou State Oil Corp.....145
Berry Sons' Co., James B...139
Biltmore Hotel 90
Blackmer Rotary Pump Co. .....Fourth Cover
Buckeye Iron & Brass Works 2
Butler Mfg. Co.....146-147

Canfield Oil Co. 101
Champion Spark Plug Co.... 13
Champlin Refining Co..... 82
Chek-Chart Corp. 98
Cincinnati Ball Crank Co.... 9
Cities Service Co. 85
Classified Advertisements... 48
Conewango Refining Co. 138
Consolidated Lamp & Glass Co. 130
Continental Can Co. 103
Curtis Pneumatic Machinery Co. 120

Dennis Co., Martin 120

Electric Storage Battery Co.. 4
Erie Meter Systems, Inc..... 49
Esso, Inc. 88
Ethyl Gasoline Corp.....14-15
Exide Batteries 4

Farrell Mfg. Co. 107
Freedom Oil Works Co. 134
Fruehauf Trailer Co. 75

Gas & Oil Lock Corp. 125
General Electric Co. 11
Goodrich Rubber Co., B. F... 3
Graver Tank & Mfg. Corp... 90

Hays Mfg. Co. 98
Heekin Can Co. 10
Huffman Mfg. Co. 142

Ingersoll-Rand Co. 66
International Lubricant Corp. 61

Jesco Lubricants Co..... 71
Johnston & Jennings Co., The 135
Joyce-Cridland Co. 111

Leland Electric Co. 91
Lubrication Corp. 105

Master Meter Duplicator Co. 79
Metasap Chemical Co.....104
Morrison Bros.....Second Cover

National Can Co. 96
National Petroleum News 89-129-133
National Pump Co. 53
National Refining Co.....117
New York Lubricating Oil Co. 55

Oil Burner Institute, Inc. .. 7
Oil Equipment Mfg. Co. 99

Penola, Inc. 109
Phillips Petroleum Co. 69
Pittsburgh Equitable Meter Co. 1
Platt's Oilgram 136
Pyroil Co. 131

Quincy Compressor Co. 5
Rand McNally & Co. 87
Republic Oil Co. 143

Shell 12
Skelly Oil Co. 59
Smith-Johnson Corp. 6
Sutherland Paper Co. 77
Southwest Grease & Oil Co... 89
Southwest Pump Co. 123

U. S. Air Compressor Co.....113
Universal Oil Products Co...148

Viking Pump Co. 160
Wilson & Bennett Mfg. Co...119
Wood Industries, Inc., Gar

Calendar Derides Taxes

CLEVELAND, Jan. 11. — South Carolina dealers, jobbers or others who use the 1937 calendar being distributed by Secretary G. M. McCuen of the South Carolina Petroleum Industries Committee, will be continually reminded by a different cartoon each month that "gasoline is cheap; only the tax is high."

The "Tax Collector" cartoon introduced by NATIONAL PETROLEUM NEWS in its Public Educational Number of last Feb. 5 is used, as well as other cartoons calling attention to the date taxes are due, the insatiable appetite of the tax collector, tax reduction, and the load on the motorist. It is hoped to produce an outraged consciousness of the overproportionate taxes now in effect.

Two Chicagoans Die

CHICAGO, Jan. 11. — Two minor officials of the Standard Oil Co. of Indiana died in Chicago last week.

Russell C. King, chief traffic clerk, died Jan. 7 from injuries received when struck by an automobile Dec. 19.

August F. Juthmann, paymaster in general office, died Jan. 5. Interment was Jan. 8 at Waldheim cemetery.

Famed Chemist Dies

N. P. N. News Bureau

CHICAGO, Jan. 11. — Dr. Julius Stieglitz one of the world's great organic and physical chemists died of pneumonia at the Chicago Memorial Hospital, Jan. 10. He was 69 years old.

Dr. Stieglitz was a member of the faculty of the University of Chicago for 43 years, being head of its chemistry department when he retired from active duty in 1933. He remained, however, as a lecturer and research worker.

At the time of his death, Dr. Stieglitz was a consultant for Universal Oil Products Co. and was giving a lecture course on organic chemistry at Riverside for the benefit of Universal's technical staff.

Pioneer Jobber Dies

LAWRENCE, Mass., Jan. 8.—W. H. Reardon, outstanding citizen and pioneeer in the oil business here, died Dec. 30 at age 71. Founder of the Keystone Oil Co. in 1888 he opened the city's first filling station in 1919.

Letter from Ellick Botts

Larger Room for Proration Meetings Must Be Planned in New State Building

To the Editor:

It has been too cold around here to get out and find out the truth of the many matters that are going the rounds concerning oil. Nearly all of our oil men are shut down and sitting back in front of the fire reviewing the recent election, and so on. We don't have much cold weather here but what we do have is thorough.

Needless to say, all business has been interrupted by the weather. Several of the boys in this district had planned a sit-down strike but the norther came along with snow and sleet and it is quite a hardship to have to roost on a jack beam covered with icicles. So the boys decided to go along with the capitalistic system until sitting down places more nearly match bodily temperatures.

What I wanted to discuss, however, in this lull in petroleum affairs, is the opportunity which now faces the industry in Oklahoma and I want to use this small space to bring it to the attention of all the big oil men. I know who most of them are, as their salaries were published in the newspapers just last week, but I have only a unilateral bowing acquaintance with most of them, hence cannot approach them directly.

The thing I want them to get in on is this new office building which will be built by the state of Oklahoma. The legislature set aside one million dollars the other day and an architect has been engaged, at a sizable fee, to draw the pictures for the building, of which he will draw two sets, one for the building if it costs one million and another and bigger one, if Gov. Marland can get the federal government to kick in with 45 per cent of the cost.

What the oil business should demand of the state is a bigger room in which to conduct proration hearings. We have much difficulty now. The hearings are so well attended by deputy conservation agents and proration umpires that many oil men have to stand. The state boys always get there early, usually coming in from their posts of duty the night before, and they grab all the seats. Of course their faithful attendance is an expression of zeal. They want to get the word as soon as possible about allowable production, and so on. so they can go back and enforce it right from the minute it is effective.

While we can see now that, within a few months, proration in Oklahoma is going to consist chiefly of accumulated underages, nobody expects the ardor of the corporation commission to abate at all. The big proration machine may not grind much grist but it will keep right on running.

With this in view, the oil men may expect to keep on going to hearings. It is no more than fair that they be given individual chairs and not have to stand up or hold a deputy umpire in their laps. Maybe the A. P. I. through some of its numerous committees could be of assistance in obtaining this form of relief for oil men.

Whatever approach to the problem is decided upon, speed should be displayed, as the plans for the new building will be drawn soon and construction will be started as quickly as space can be found between the derricks that surround the present capitol. Martial law declaration, always a prerequisite to any important state action in Oklahoma, hasn't yet been declared to break ground for the new building but I understand the governor has the proclamation about finished.

Yours truly,
Ellick Botts,
Consulting pumper,
Gray Horse, Okla.

Oil Trades To Meet

NEW YORK, Jan. 4.—The quarterly meeting of the Oil Trades Association of New York City will be held at the Waldorf-Astoria Hotel Jan. 19. Dinner will be served at seven with a vaudeville show to follow.

WASHINGTON

From the Crown Block . . .

By A. M. PETTY
N. P. N. Washington
News Bureau

WASHINGTON, Jan. 12

A presidential message in the near future urging Congress to take steps toward federal regulation of stream pollution is expected by some officials of the National Resources Committee. At the White House now are the committee's recommendations for conservation of water resources, including prevention of pollution.

If based on the committee's report, as is expected, President Roosevelt's recommendations to Congress may not entirely coincide with the ideas of Senator Lonergan, of Connecticut, who has just reintroduced his pollution bills left over from the last Congress.

Naively, or otherwise, Senator Lonergan professes to believe that his bills will not meet with much opposition.

Once their purposes are understood, Lonergan believes that neither the states nor industries affected will fight the measures. Heretofore the states have been hesitant about surrendering their rights to federal district boards set up to control pollution, while interested industries, such as oil, are worried about the broad powers and vague wording of Lonergan's legislation.

The proposal in President Roosevelt's governmental reorganization plan to make the National Resources Committee a planning body only, directly under the President, may force Lonergan to suggest a new agency to administer his pollution plan. Under the Lonergan bill (S. 13) it is proposed to make the National Resources Committee the administrative agency.

Fights Connally Law

Those interested in extending the Connally "hot" oil law would do well not to underestimate the opposition expressed by Paul E. Hadlick on behalf of the National Oil Marketers Ass'n.

Hadlick puts into his campaigning a dogged determination that brings results—as witness his success in bringing about almost single-handedly the justice department's oil investigation culminating in the indictments returned by the federal grand jury at Madison.

Attacking the Connally law from the standpoint of its alleged effect on prices of petroleum products, Hadlick makes a strong appeal to senators and congressmen from oil-consuming sections, such as New England. Besides his pamphleteering activities, Hadlick has in mind several new moves against the Connally law which will attract attention, if not win him support, in Congress.

R. P. Law Starved Out?

Enforcement of the Robinson-Patman anti-discrimination law is likely to suffer from a lack of funds, unless its friends in Congress take a hand. So far, the Federal Trade Commission has been handicapped by the fact that no appropriation was made for handling matters arising under this statute. The best the FTC could do was delegate a couple of attorneys to the task, and they have been swamped.

In his budget message to Congress, President Roosevelt asks $1,950,000 for the Federal Trade Commission, which is an increase of about $450,000 over that for the current fiscal year. BUT, because of other commitments, little if any of this increased appropriation will go for R-P law enforcement.

But this "oversight" has been called to the attention of Congressman Patman, of Texas, who piloted the anti-discrimination law through Congress despite lack of encouragement from the White House. Patman is not likely to stand by idly while his brain-child starves.

Hypoid Specifications?

Although the Treasury Procurement Division doesn't like to think about it, there may be a headache looming for the government's central purchasing agency in buying lubricants for motor vehicles equipped with the new hypoid gears.

Some individual governmental agencies now buying automobiles with hypoid gears say they are purchasing in the open market the kind of lubricants specified by the manufacturers.

But as the number of vehicles with hypoid gears increases, it is likely that the Treasury Procurement Division will be asked to contract for all the government's requirements of hypoid lubricants.

The next step would be the drafting of specifications for hypoid lubricants. The procedure then would be to advertise for bids, as the TPD now does for gasoline.

Strange as it may seem, there are some purchasing agents in the government who have not yet heard of hypoid gears.

R-P Law Doesn't Apply

Attorney General Cummings has snuffed out the faint hope that the Robinson-Patman law against price discriminations might put an end to the extremely low prices for gasoline being quoted to the treasury procurement.

In an official opinion rendered at the request of the War Department, the Attorney General has ruled that the R-P law doesn't apply to purchase by the federal government.

'Gas' Tax Revenue Seen Increasing

By Teletype
N. P. N. News Bureau

WASHINGTON, Jan. 12.—Government tax experts apparently anticipate continued increases in gasoline and lubricating oil consumption in the U. S. for at least 18 months.

In recommending continuance of present taxes, the President's budget message to Congress estimates that revenues from the gasoline excise tax during the coming fiscal year (July 1, 1937, to June 30, 1938), will be $204,000,000, compared with the estimate of $195,000,000 for the current fiscal year ending June 30, 1937, and actual receipts during the last fiscal year, which ended June 30, 1936, of $177,339,587.

Similar increases in lubricating oil excise tax revenues also are anticipated, with the budget estimate for the next fiscal year placed at $33,300,000, compared with the estimate of $31,500,000 during the current fiscal year and receipts of $27,102,831.57 last fiscal year.

If not extended as the President recommends, these two taxes, would automatically expire this year. In his budget message the President said of them: "I consider that the revenue from such taxes or its equivalent is necessary for the financing of the budget for 1938 (fiscal year)."

Reforming Is Topic For Refiners' Program

N. P. N. News Bureau

TULSA, Jan. 9.—A committee of five, headed by Emby Kaye, Skelly Oil Co., is at work arranging the technical program to be presented at the annual convention of the Western Petroleum Refiners Association.

Directors have voted to change the date and place of this meeting—the Silver Anniversary Convention—to Hot Springs, Ark., at the Arlington Hotel, April 26, 27 and 28. Originally the directors had chosen Mineral Wells, Texas.

The session April 26 will be devoted to committee meetings. The technical session will be held April 27 and the general session, election of officers and meeting of the board will be held April 28.

These three subjects are being considered for discussion at the one-day technical session; Economics of Gum Removal, Gasoline Sweetening and Reforming. The subject of reforming is particularly timely, committee members point out, because of possibilities it presents for producing high octane gasoline without the addition of lead. Other subjects are important, due to their economic influence on plant operations.

In addition to Kaye, the program committee is composed of Walter Miller, Continental Oil Co.; H. W. Camp, Empire Oil & Refining Co.; W. F. Sims, Panhandle Refining Co. and R. B. Pierce, Louisiana Oil & Refining Co.

Georgia Refinery Closes

PHILADELPHIA, Jan. 8.—Employes at the Atlantic Refining Company's refinery at Brunswick, Ga., where refining operations were discontinued this week, have been offered employment in the company's new refinery soon to be completed at Atreco, near Port Arthur, Texas, according to W. M. Irish, president of the company.

Atlantic will continue to use a portion of the existing facilities at Brunswick as a distribution center for petroleum products to be refined at the new Atreco refinery.

Bill Allows State to Develop Tideland Field in California

N. P. N. News Bureau

LOS ANGELES, Jan. 9. — Possibility of state development of California tidelands took shape the past week, with the introduction of a bill to the 1937 legislature providing for the drilling of wells into these oil reserves either by the state or by private interests through competitive bidding.

The measure, titled Assembly Bill No. 151, was introduced by Assemblyman Waters of Los Angeles, in accord with suggestions made by Governor Merriam.

Introduction of the bill was temporarily held up by the governor when it was pointed out that it could be interpreted to permit actual drilling in the ocean. The chief California executive said he would not sponsor a measure that might injure the beaches and ordered an amendment to prohibit drilling on the beach sands.

Contention of opponents to the bill centered around the belief that it would allow drilling to be conducted from "islands" constructed offshore, a proposal that was defeated in the 1935 session of the legislature. The measure is the first of a number of similar bills expected to be offered between now and Feb. 1, for tideland exploitation.

The Merriam bill proposes drilling be confined to an area of about 15 square miles in Orange county. It does not advocate general tideland drilling, although others to follow are expected to include additional area.

Jurisdiction over execution of leases would rest with the state director of finance, who would also have the discretionary power to "prospect for, drill for, extract, remove and dispose of oil, gas or other hydrocarbons or minerals" in the name of the state.

The state may lease, purchase or acquire by eminent domain condemnation lands for drilling sites. This provision would permit the state to obtain locations on the mainland for slant or directional drilling into the tideland part of the Huntington Beach pool.

Private leases would be for an initial ten-year period, with a provision for five-year extensions. Any lease executed under this measure must include provisions to prevent pollution or contamination of beaches and the ocean. "Reasonable precautions shall be taken to minimize interference with the use thereof for public bathing, fishing, or other recreational purposes."

Profits Anticipated

Revenue from the sale of oil on this public land will go into the general fund. The governor, in announcing he would sponsor a tideland development bill, said he saw where the state might pay off its debt from profits on oil from these lands and might even be able to carry its relief burden in addition.

No provision is made for royalty payments in this bill. It is reported the hope of sponsors that private interests will become so active in bidding for the privilege of developing this land that they will forget to stop. A royalty of 40 to 50 per cent was considered not unreasonable in view of the fact that the field was proven.

Among other measures introduced the past week affecting the oil industry was a provision to make oil pipelines common carriers under jurisdiction of the California Railroad Commission.

Renewal of the sales tax fight was seen in a measure providing for exemption of all foodstuffs, including meals sold in restaurants and eating places, from the tax. A similar proposal was sponsored by Democrats at the 1935 session but was defeated by the Republicans. However, the followers of Thomas Jefferson rolled up a huge majority in the November election for representatives to the state congress and the story is likely to be entirely different from here on. Another proposal affecting the sales tax would reduce the rate to 2½ per cent from 3 per cent.

Assemblyman Hunt, of Los Angeles, offered a bill to limit freight trains to 70 cars and passenger trains to 14 cars, notwithstanding court opinion against similar laws in several other states and a veto of a similar bill by Governor Merriam, in 1935.

Institute Group To Study Oil Well Spacing Practice

N. P. N. News Bureau

NEW YORK, Jan. 11.—Proper spacing of oil wells is to be studied by an American Petroleum Institute committee of 32 oil-company executives headed by George A. Hill, Jr., of the Houston Oil Co. Appointment was made by President Axtell J. Byles.

The committee will collect fundamental data and prepare an educational program designed to promote proper spacing as an important factor in petroleum conservation.

Studies of technically efficient and economic well spacing have been conducted for several years by committees of the A.P.I. division of production and numerous papers have been prepared on this subject.

Conclusion always drawn was that correct spacing depends upon underground conditions which vary widely between pools and no formula can be stated that will apply to all fields.

In the annual address of President Byles in Chicago last November it was asserted that regulatory bodies of the principal producing states hold the answer to the problem of unnecessary drilling. Proration practices which allot allowables to the well with no regard to acreage drained lead to the drilling of many wells over the number that are really needed, he said. The outstanding example of this is the East Texas field where there is now an average of one well to slightly more than six acres. Engineers have repeatedly asserted that one well would efficiently recover the oil from 20 acres in that field.

The same general conclusion was asserted by a subcommittee of the Independent Petroleum Assn. of America at Oklahoma City the last of November. Report was made by R. E. Hardwicke, Fort Worth attorney, head of a special committee of nine. (N.P.N. Dec. 2, p. 9)

Recently regulatory bodies of Louisiana and Texas moved a step toward recognition of economic spacing when orders were written changing proration basis in the Rodessa field which lies in the two states. The allowable is now based partly on acreage which a well drains.

Advisability of bettering the spacing of wells was established by recent experiments in well-spacing, particularly through the development of oil pools on the unit plan with all wells drilled in strict accordance with scientific determination of production needs.

Members and alternate members of the Committee on Well Spacing, which is to file its report with the Institute's Board of Directors, follows:

Committee Makeup

W. H. Berg, Standard Oil Co. of Cal., San Francisco; (M. E. Lombardi, alternate); J. D. Collett, O'Keefe & Collett, Fort Worth; Wirt Franklin, Wirt Franklin Petroleum Corp., Ardmore, Okla.; R. G. A. van der Woude, Shell Union Oil Corp.; New York; (Alexander Fraser, Shell Petroleum Corp., St. Louis, Mo., and S. Belither, Shell Oil Co., San Francisco, alternates); Jake L. Hamon, Cox & Hamon, Dallas; H. L. Hunt, Tyler, Texas; W. M. Irish, The Atlantic Refining Co., Philadelphia; (W. M. O'Connor, alternate); A. Jacobsen, Amerada Petroleum Corp., New York; (A. M. Blow, Amerada Petroleum Corp., Tulsa, Okla., alternate); Ralph B. Lloyd, Lloyd Corp., Ltd., Los Angeles; and John M. Lovejoy, Seaboard Oil Co., New York; (R. S. McFarland, Seaboard Oil Co., Dallas, alternate).

W. S. S. Rodgers, The Texas Co., New York; (R. Ogarrio, and C. E. Olmsted, The Texas Co., Los Angeles, alternates); J. Edgar Pew, Sun Oil Co., Philadelphia; (M. B. Sweeney, Sun Oil Co., Dallas, alternate); Frank Phillips, Phillips Petroleum Co., Bartlesville, Okla.; (C. P. Dimit, alternate); E. B. Reeser, Barnsdall Oil Co., Tulsa; (R. A. Broomfield, Barnsdall Oil Co., Los Angeles, alternate); Charles F. Roeser, Roeser & Pendleton, Inc., Fort Worth; E. G. Seubert, Standard Oil Co. (Indiana), Chicago; (A. W. Peake, and Frank O. Prior, Stanolind Oil & Gas Co., Tulsa, alternates); and H. F. Sinclair, Consolidated Oil Corp., New York; (C. E. Crawley, and W. L. Connelly, Sinclair Prairie Oil Co., Tulsa, alternates).

W. G. Skelly, Skelly Oil Co., Tulsa; (H. M. Stalcup, alternate); W. S. Farish, Standard Oil Co. of New Jersey, New York; (J. R. Suman, Humble Oil & Refining Co., Houston; C. H. Lieb, Carter Oil Co., Tulsa; and J. R. McWilliams, Standard Oil Co. of Louisiana, Shreveport, La., alternates); R. L. Wheelock, Wheelock & Collins, Corsicana, Texas; F. A. Leovy, Gulf Oil Corp., Pittsburgh; (W. B. Pyron, Gulf Oil Corp., Houston, and Rush Greenslade, Gulf Oil Corp., Gypsy division, Tulsa) and J. A. Brown, Socony-Vacuum Oil Co., New York; (W. L. McLaine, General Petroleum Corp. of Cal., Los Angeles, and D. A. Little, Magnolia Petroleum Co., Dallas, alternates).

O. D. Donnell, The Ohio Oil

(*Continued on page 27*)

Oil Well Spacing Case Again Filed In Highest Court

N. P. N. News Bureau

WASHINGTON, Jan. 11.—Magnolia Petroleum Co. has again asked the U. S. Supreme Court to review a lower court's decision denying Magnolia an injunction against operators of an adjoining East Texas well said to have been drilled in violation of the Texas Railroad Commission's Rule 37 (well-spacing).

Pointing out in its petition that a ruling is of "vital importance to the industry", Magnolia says, because of the lower court's decision the Texas Railroad Commission is "seriously handicapped" in enforcing its proration orders, and will be compelled to grant allowables to illegal wells of a non-resident but deny them to similar wells of residents of Texas.

Facts of the case, according to Magnolia's brief, were:

G. T. Blankenship drilled on a half-acre tract adjoining a Magnolia lease while a temporary injunction kept the Texas Railroad Commission from interfering. The commission had previously denied Blankenship a permit to drill. After the well was finished, Blankenship dismissed the injunction suit before a higher court could act on an appeal.

The railroad commission sued and collected a $1000 fine for drilling without a permit.

Then Magnolia sought an injunction in federal district court (because of diversity of citizenship) to prevent the well from producing, and was told that its remedy was to obtain a proration adjustment order. This view was upheld by the U. S. circuit court, whose decision the Supreme Court refused Dec. 14 to review.

Magnolia's new petition again points out that the U. S. court opinions are in conflict with Texas state court opinions on the same question, with the result that a non-resident who sinks a well illegally cannot be enjoined (because the case must be taken to a federal court), but the non-resident can then enjoin his neighbor, a Texan, in a state court from doing the same thing.

Therefore, the petition says, the Supreme Court should review the case since the lower U. S. courts have "decided an important question of local law in a way probably in conflict with applicable local decisions."

Mid-Continent Skyline

By LAWRENCE E. SMITH, N. P. N. Tulsa News Bureau

TULSA, Jan. 9

The crude oil price situation: Nobody has met the three companies which are paying 17 cents a barrel more than the majority postings. The three are Continental Oil Co., Barnsdall Oil Co. and Globe Oil & Refining Co. Continental made the motion early in December, Barnsdall seconded it and Globe called for the question.

The day the new Continental et al schedule became effective, Jan. 4, was pretty exciting. Everybody telephoned everybody else to see whether the increase would become general. The next day the calls were fewer and as the week closed nobody was asking about price any more. The big company heads just wouldn't discuss it at all. As C. D. Lockwood Houston, remarked, "Silence is golden—except when it applies to price increases."

It has long been a fixation of some politicians that the big oil companies are in cahoots on all important matters. This price business should be quite convincing evidence of the way they disagree on most things.

Oklahoma's Subterfuge

Regulatory bodies have bickered quite a little in recent months over production quotas. Oklahoma and Kansas clung tenaciously to the Bureau of Mines recommendations—usually overproducing, by the way—while Texas insisted on rolling their own appraisals of the market demand.

Kansas and Oklahoma deserted the bureau figures for December and increased allowables by about the same percentage that Texas had. Kansas continued that course for January. After stalling on the matter until Jan. 5, Oklahoma's Corporation Commission emitted an order which asserted that the daily market demand for January was 573,100 barrels daily. That is the figure recommended by the bureau.

But, getting down into that part of the order which sets out the quotas by pools, it is discovered that several pieces of scrap iron have been concealed in the boxing gloves. For instance, the schedule carries for the Crescent pool, 8582 barrels as daily reasonable market demand, and gives per cent of potential as 2.5 and potential as 365,973 barrels. The real allowable is the per cent of potential; and 2.5 per cent of 365,973 is 9149 barrels—567 barrels per day more for the Crescent pool than the order purports to allow. This is one of many such tricks in the order. Some are comical. The Earlsboro group of pools is credited with a "daily reasonable market demand" of 10,659 barrels daily and that is splendid for purposes of adding up with another string of figures to show agreement with the bureau forecast, but the allowable is 100 per cent of a potential of 15,655 barrels.

The real allowable of Oklahoma for January is not 573,100 barrels daily but something considerably higher. Last week we said it was about 16,000 barrels more than the bureau recommendation. Some proration watchers have taken us to task for that statement and it appears an apology is due. They insist that we are at least 4000 barrels low in our estimate of how much above the bureau figure Oklahoma had really gone.

Deals for Production

Many deals are gossipped about now. Every large user of crude is looking about to strengthen its position. Largest of recent date in the Mid-Continent was that of Atlantic Refining Co. L. E. Douglass, Hutchinson, Kans., sold his Rice county, Kans., properties to Atlantic for a reported price of $800,000, of which $200,000 was cash and the rest $100,000 per year for six years. Properties consisted of 680 acres of leases and three producing wells with combined potential of 3500 barrels. Much of the acreage is considered certain to produce.

Lion Oil & Refining Co. announced the purchase of a 50 per cent interest in a big producing lease from Kirby Petroleum Co. in Glasscock county, Texas, and the same company has option on properties of the E. L. Smith Oil Co. in Texas.

And many a look is being given to old, steadily producing properties that commanded no attention at all during the years of the big flush production.

Intangible Tax Upheld

Third Court of Civil Appeals in Texas has upheld the Texas law which taxes intangible assets of pipeline companies and should this decision be sustained all along the line, the new taxes gathered in will be large. The law is four years old but no taxes have yet been collected, as the act was attacked promptly.

The law levies a tax upon the intangible assets of the lines, meaning capitalization of the net profits over the physical inventory values. The law provides for collection of the tax by the counties through which the pipeline passes, with the intangible values set by the state tax board. Local assessors then apply the ad valorem rate prevailing in their county.

The case disposed of by the state court is that of The Texas Pipe Line Co. A similar suit is now before the U. S. Court of Appeals in New Orleans, this one having Atlantic Pipe Line Co. as plaintiff.

Institute Group

(*Continued from page* 26)

Co., Findlay, O.; (W. W. Fleming, The Ohio Oil Co., Tulsa, alternate); Frank R. Coates, Cities Service Co., New York; (H. R. Straight, Empire Oil & Refining Co., Bartlesville; Burdette Blue, Indian Territory Illuminating Oil Co., Bartlesville; and D. W. Harris, Arkansas Natural Gas Co., Shreveport, La., alternates); Henry M. Dawes, The Pure Oil Co., Chicago; (R. W. McIlvain, alternate); and D. J. Moran, Continental Oil Co., Ponca City, Okla.; (R. E. Collom, Continental Oil Co., Los Angeles, and J. G. Dyer, Continental Oil Co., Ponca City, alternates).

L. P. St. Clair, Union Oil Co. of Cal., Los Angeles; (F. F. Hill, alternate); E. L. Shea, Tide Water Associated Oil Co., New York; (E. H. Salrin, Tide Water Associated Oil Co., Houston, and J. H. Jenkins, Associated Oil Co., San Francisco, alternates); E. DeGolyer, Felmont Corp., Dallas; N. C. McGowen, United Gas Public Service Co., Houston; and E. H. Moore, E. H. Moore, Inc., Tulsa.

Bill To Grade Motor Fuels Is Talked for N. Y. State

N. P. N. News Bureau

NEW YORK, Jan. 11.—A bill to grade gasoline in New York state by arbitrary standards set up by the state — in the same manner as milk is now graded—probably will result from the hearings and investigation of the Ehrlich joint legislative committee investigating gasoline prices.

As a session of the special committee came to a close here tonight, after hearing witnesses representing large oil companies for two days, Assemblyman Harold B. Ehrlich, of Buffalo, reiterated the indication which he gave previously that the grading proposal provides the only safeguard for the consuming public.

Trade Mark Only Guide

"Under present conditions, the only guide purchasers of gasoline have to go by is the trade mark," he said. "Under a grading law the purchaser could go to any service station in the state, knowing that the 'Grade A' gasoline he purchased there was the same as that he bought in Poughkeepsie a week previously or in New York City the day before. If one station was selling 'Grade B' gas at 12 cents, and another at 14 cents, the purchaser could purchase from the station with the lowest price, with the knowledge that he was getting the grade of gasoline he wanted—and for which he would have to pay extra a block down the street."

Of course, no such spread is anticipated, he said, adding that it was merely an example of what is expected of the grading law.

Samples Tested

At the Saturday session, Ehrlich said that his committee had examined 150 samples of gasoline and found 80 of them substantially alike. He said that on opposite corners the committee had found stations at one of which "gas" was selling for 17⅛ cents, and at the other 14⅛ cents. Bulk of the trade, however, went to the higher-priced gasoline, due to psychology created by the mass advertising of the large companies, he said. Under a grading system, the trade would be more widely distributed, he said, and the customer could be sure of what he was buying anywhere.

Oil men testifying at the hearing, most of them sales managers or marketing heads of large companies, objected that the plan would be unworkable and impractical. Some admitted that it might benefit the consumer, but most of them took the view that the public could take care of itself by patronizing the reputable companies. They said that the highly competitive nature of the industry also kept the price to the consumer well within his reach, and that there had been no gasoline on the market for years that would harm an internal combustion motor.

Object to Grading

Witnesses at the Saturday session, all of whom objected to the proposed state grading, included George A. Perriman, eastern manager of the Socony-Vacuum Oil Co.; William L. Kallman, eastern sales manager of The Texas Co.; Daniel M. Cox, sales manager of Colonial Beacon Oil Co.. Walter L. Day, Jr., assistant to the vice president in charge of marketing, Shell Union Oil Corp.; Edward D. Rohrbach, assistant eastern manager of the Pure Oil Co., and Erwin C. Stein, assistant general manager of the northern division of the American Oil Co.

Questioning at Monday's session, conducted by Chairman Ehrlich, Committee Counsel Alger A. Williams, and Associate Counsel Isidor E. Schlessinger, took a slightly different slant from that on Saturay. Seizing upon the statewide rise in gasoline tank wagon prices on Dec. 28, the questioners sought to establish that all oil companies in the state follow the lead of Socony-Vacuum with regard to price increases and decreases.

Schlessinger in questioning Frank D. MacEachern eastern divisional sales manager for Tide Water, asked:

"If Socony-Vacuum would sell gasoline in New York for 20 cents, then, you would raise your price to meet theirs?"

MacEachern said "Yes, we would," and agreed that his company probably also would follow a decrease led by Socony.

Sun Follows Nobody

Kenody R. Ware, regional manager for Sun Oil Co., however, attributed the late December price rise to higher ocean freight rates. He declared Sun "followed nobody" when it raised tank wagon prices in the state just after Christmas, although virtually all the other witnesses both days except Perriman, who also blamed increased freight rates, said they followed the rise of the other companies. Reminded of this, Ware opined that "maybe they followed us."

Asked if his company considered newspaper price quotations and similar information in making price changes he guessed it was "possibly so." He was asked also for figures on the increased cost of a barrel of crude laid down at Sun's Marcus, Pa., refinery since the increase he spoke of in freight rates, but was unable to present them at the hearing.

Ware said his company is selling at the same prices as the other majors in all places except Vermont, where some cuts have been made "to meet independent competition."

No Retail Control

All of the witnesses testified that their companies have no control over prices charged consumers except at company-operated stations, which, to base an opinion on the testimony, are almost extinct in the Empire State.

After listening to a number of the witnesses testify that they raised their prices because other companies who were important factors in the field did so Ehrlich remarked that it appeared "your profits depend more or less on your competitors," and, on agreement by the witness then on the stand, he concluded: "Well, you're at the mercy of somebody, I don't know who."

E. Waldo Emerson, New York divisional manager for Gulf Oil Corp., testified, under questioning by Schlessinger, that his company raised its prices when they read of the proposed increase by Socony which led Schlessinger to remark to him as he did to most of the other witnesses:

"Then increase or decrease in the price isn't based on increases or decreases in production cost?"

Emerson agreed it was not directly traceable. Then he was asked what would happen if Socony advanced and his company did not follow. He said he thought Socony would come back down to the lower price. "Then," questioned Schlessinger, "Socony are still the leaders in New York State?"

"Yes," said the witness.

"Tickled to Death"

In answer to the question as to why his company felt it must follow a price advance—what it took into consideration, for instance, on Dec. 28, George W. Hawkins, vice president of Cities Service Oil Co., said he took into consideration his company would be "tickled to death" to get 3/10 of a cent more per gallon.

But, persisted Schlessinger, why not keep the price down and thus increase sales by virtue of the differential? Hawkins answered that it was just a matter of business judgment, adding that if one company stayed down, it would result in all the companies going to lower prices, with the result that all would lose.

Gasoline Price Competitive

Counsel for the committee asked if it wasn't "apprehension" over a possible price war that made everybody follow a price rise. Hawkins did not answer directly, but declared that "nobody wants to bring on a price war, and everybody wants to get more money." He added that the price of gasoline is plenty low to the consumer now.

Asked if his company, or others, would have the right to keep the old prices even though the leaders posted an increase, Hawkins said they would, but that they had never done it.

Next on the stand Monday afternoon was James E. Dyer, vice president of Richfield Oil Co., who described the price of gasoline as strictly a "competitive price", and one whose ups and downs, as represented by increases or decreases by other major companies, were followed "arbitrarily."

No Understanding

Ehrlich very bluntly told the witness and others at the hearing that "we're interested in learning why no company will maintain a price lower than the so-called leading companies, and asked Thomas L. Harrigan, assistant New York and New Jersey district manager for Sinclair Refining Co. if there was any "understanding" among the companies. Harrigan said he "knew of none."

Harold B. Stone, New York and New Jersey sales manager for Atlantic Refining Co., said that the reason he followed price rises was that "I think it is my job to get as much for my company as I can. I wouldn't be fair to the company if I saw that I could go up on the price and didn't take advantage of the opportunity." He said, under questioning, that he did not meet the December increase primarily for the purpose of "avoiding a price war," but that this factor was given consideration.

Stone, unwittingly perhaps, played into the hands of the investigators when, in the course of his testimony he referred to gasoline as a "basic commodi-

ty," and a "public utility." The bill which Ehrlich's committee is expected to propose would have the effect of declaring gasoline a public utility.

"Has the public ever been considered in fixing 'gas' prices?" Ehrlich asked Stone, who answered that it hadn't, in New York, but added that "gasoline, as a utility, is very cheap today."

Gasoline a "Utility"

At that Ehrlich asked him if he didn't believe gasoline was as necessary to modern civilization as any "other" public utility — electricity or cooking gas, and Stone agreed.

Another feature of the hearing was the line of questioning followed in the case of almost all witnesses with regard to leasing of stations. They were asked if present lease agreements with the station operators provided for payment of social security taxes (by the operators), of unemployment taxes, public liability or compensation insurance. Most of them answered they did not.

Then they were asked if the recent rush of the large companies to lease all their stations wasn't attributable to the threat of a chain store tax, the social security law under which they would have to pay taxes on all their employes, and similar taxes and insurance premiums. All of them said that the policy of leasing stations was begun before these possibilities and they did not enter in.

Leasing Cuts Cost

The oil men declared that they found the stations could not be operated by them profitthat individual lessees made ably, and that they had found more money, increased gallonage, and in every way did better. Only one witness, Stone, frankly said that the social security law, the possibility of a chain store tax, and allied premiums and taxes constituted a factor—especially in the activity of his company (Atlantic) during the past year.

Although the proposed grading was mentioned only a few times the second day of the hearing, it was clear that all the other questions were designed to build up a basis for the proposal when it comes before the legislature.

On adjourning the hearing Monday afternoon, Chairman Ehrlich, the only member of the committee present, said that the full committee will meet next Tuesday, Jan. 19, at Albany to go over the evidence accumulated, and will make further plans at that time. It is probable that representative retailers will be called in for a later hearing to discuss that phase of the oil business, since it is Ehrlich's purpose to have a complete picture of the business before he proposes his legislation, he said.

The committee already has visited refineries and oil fields in Pennsylvania. It probably will make its report to the New York Legislature sometime around Feb. 15. While the report itself will be a factual one, the grading proposal and other legislation will be based upon it, Ehrlich said.

Truck Drivers Strike Is Settled

AKRON, O., Jan. 11.—Deliveries of gasoline were resumed in Summit county Jan. 7 when striking tank truck drivers voted to accept the agreement reached between their representatives and the oil companies. Virtually all sales of gasoline had been stopped since Jan. 5, when the service station attendants union joined the strike in order to shut off gasoline supplies entirely and speed settlement of the strike.

The strike was settled on approximately the basis of the last offer made by the oil companies before the strike was called at noon Jan. 2. The new contract calls for a pay increase of about 8 per cent, and incorporates a 40-hour, 5-day week. It replaces the contract which expired Jan. 1, and which had been in effect since May, 1934.

Under its terms truck drivers and maintenance men will receive a minimum of $120 per month the first year of employment, $130 the second, and $135 thereafter. Warehousemen, loaders, and yardmen will get a minimum of $90 per month first year of employment, $92.50 the second, $97.50 the third, and $102.50 thereafter. About 85 per cent of the men affected have had 4 years' service.

The question of vacations with pay was not included in the contract, but many of the oil companies give their men vacations.

Service station operators went back to work as soon as the agreement was reached.

There was a minimum of disturbance during the strike. None of the oil companies, except the three which signed agreements with the drivers when the strike was called, attempted to make deliveries. It was mainly to stop these companies and the trackside stations which caused the service station union to strike.

April 1 Is Date For Unionization Of Oil Industry

N. P. N. News Bureau

LOS ANGELES, Jan. 9.—With incalculable losses resulting to Pacific Coast business from the extended maritime strike, the announcement is made that April 1 will see the most extensive program ever attempted to organize oil industry workers.

Harvey Fremming, head of the International Oil Workers' Union, which holds a committee for Industrial Organization charter, made some details of the proposed campaign public following a meeting of the I.O.W. executive council in Long Beach. Additional details will come from the union's headquarters in Washington, it was said.

Claims 1,000,000 Members

The vertical unionization of oil workers throughout the country was declared by Fremming to have a potential roll call of about one million. This would include 250,000 workers in the oil and gas fields and in refineries, and 750,000 in other branches, including marketing, he said.

A membership drive in which John L. Lewis, head of C.I.O., was expected to play a leading part, would be conducted along the same general lines as those followed in recent attempts to organize workers in the steel industry.

Demands provide for a minimum wage of $5 a day for common labor and for a 36-hour week. Although few oil companies pay less than this minimum on the Pacific coast, the scale is based on a minimum of $4.16 and it is this figure that the unions would raise to $5 with proportionate boosts in the higher brackets.

Short Week Is Problem

Although the 36-hour week can be made to fit in with large scale operation, it presents definite problems for the smaller operator who does not have sufficient work to provide part-time work for a full-time relief operator.

Officials of the I.O.W. adopted a program at Long Beach calling for presentation of their problems to the California legislature.

Measures will be introduced on behalf of labor to outlaw company unions and to force employers to permit union organization, it was stated. An anti-injunction measure has already been filed, which would permit picketing and prohibit injunctions against this activity. Extension of the workmen's compensation benefits and safety enactments will also be sought.

Spokesmen for the I.O.W. intimated a settlement of the split between the American Federation of Labor and the Committee for Industrial Organization was expected to take place at a conference in Washington in February. In view of this, the executive council agreed to take no action on the squabble.

Hearings Continue

In the meantime, hearings continued before the National Labor Relations Board in Los Angeles on the charge by the I.O.W., that Shell Oil Co. had violated provisions of the labor relations act. Observers believed this case would not be drawn to a close until after Feb. 1.

It was developed from testimony called by government counsel the past week that Shell employes had failed to get a 10 per cent increase in wages because of lack of agreement between union heads and employes. In 1934, union officials upset negotiations between Shell and its employes when they intimated any individual agreements entered into by the various groups of workers would cause the employes to miss out on a better agreement being negotiated by the unions.

Offer 10% Boost

At this time the 10 per cent increase was offered by the company but, because of disagreement among the workers, was not accepted. In 1935 the election for representation under the Petroleum Labor Policy Board was held and the result was the negotiation of a memorandum of terms by the unions. However, it was brought out at the hearing the workers did not receive the 10 per cent increase previously offered.

The sum and substance of testimony offered by government witnesses at this hearing has been to show a general feeling of dissatisfaction by the workers of results obtained by the unions. Petitions have been circulated, it was declared without any sponsorship by the company, urging a return to the conference delegate plan of representation.

Barges to Oust Rails

BIRMINGHAM, Ala.—Tentative plans of the Gulf Refining Co. and the Standard Oil Co. to switch from railroad transportation to barge lines wherever possible in the southeast is reported here. The Gulf is reported planning to purchase land on the Tennessee river at Decatur and Sheffield for location of storage tanks. Both the Warrior river and the Tennessee would be widely used.

State-Owned Terminal Urged To Safeguard "Fair" Prices

RALEIGH, N. C., Jan. 11.—A state-owned oil terminal for North Carolina is "entirely practical and feasible" but is not expedient at this time because of the "favorable" price at which the state is now buying gasoline, according to the Gasoline Terminal Commission's report to the North Carolina general assembly.

Under present contracts, the state is now paying 0.2 cent off posted tank car price for tank wagon delivery anywhere in the state. The commission said this seemed a "fair" price for the 10,000,000 gallons of gasoline purchased annually by North Carolina.

But as a "matter of protection" the commission recommended that the state avail itself immediately of plans and specifications for a state owned and operated terminal. To this end, an appropriation of not over $100,000 should be made for building such a terminal "when and if" the Council of State should deem it advisable and expedient, the report urged.

While the state is obtaining a "fair" price, the commission charged that the gasoline-buying public of North Carolina is being discriminated against.

Competition Lacking

"The total absence of Independent competition in North Carolina," the report added, "has made it possible for the major oil companies to maintain normal or above normal prices in North Carolina, whereas, in many sections of the country and in many states, keen competition has provided below normal prices.

"The commission is of the opinion that every agency of the state of North Carolina, delegated with power and authority, should use every possible effort to demand and bring about a price structure for the public based on fair prices for North Carolina, and that the people of North Carolina should not bear the burden created by competition and price wars in other states and sections of the country," the report added.

Other recommendations to correct conditions in the distribution of gasoline were made by the commission, headed by Oscar Barker, of Durham, N. C., which was appointed under authority of a resolution adopted by the 1935 state legislature. Included in these was a complete overhauling of the gasoline and oil inspection laws of the state.

The commission reported that the inspection of gasoline and the distribution equipment used in North Carolina are "deplorable". The commission did not find fault with state agencies but blamed the "inadequacy of outmoded laws and the practice of oil companies in the use of obsolete equipment.

Short Measure Charged

Short measure and dilution of gasoline by distributors and retailers are prevalent in nearly every section of North Carolina, the report charged.

"The shortage in measurements," the report added, "is due primarily to a lack of modern equipment; the dilution of gasoline, with the aid of naphtha and kerosine, has been for the purpose of cheating and defrauding the buying public and the buying public has been powerless to defend itself."

To combat these two evils, the commission suggested that the entire duty of inspection, including the testing of measuring equipment, should be turned over to the state inspection department. Inspection personnel should be greatly increased and modern equipment provided for testing gasoline by octane rating.

"Price Fixing" Reported

Declaring that the commission found "considerable evidence" of price-fixing in the oil industry in North Carolina, the report urged the state attorney general to draft amendments tightening the state antitrust laws for submission at the legislative session now in progress.

The attorney general was also urged to investigate alleged discriminations in intrastate railroad freight rates.

The commission found that one of the most important factors in the "high cost" of gasoline is the overlapping in distribution, wholesale and retail.

"The greatest factor in this overlapping of distribution is caused by the mushroom growth of service stations throughout the state, with no semblance of system or efficiency," the report added. "The cost of building and operating service stations has added tremendously to overhead charged in the petroleum industry. The excessive number of service stations, many of which are poorly located, from the standpoint of prospective business has made is necessary for commissions (margins?) to appear excessive."

Too Many Stations

The vast number of retail gasoline outlets makes the cost to the public "much higher than would be necessary under a simpler system of distribution", said the report in recommending that laws be enacted requiring permits for increase in "distribution outlets" on the basis of public need for additional service.

Another recommendation was that the state immediately inaugurate a system of state-owned equipment. During the hearings it was testified that gasoline pumps, tanks and other equipment at the approximately 1600 points at which the state received deliveries are owned by oil companies and loaned to the state. The commission commended the state school commission for its plan of operating its own tank trucks with one truck servicing school buses in a county, and urged its extension to all counties.

Fix Gasoline Standards N. Carolina Board Urges

RALEIGH, N. C., Jan. 11.—Establishment of a state gasoline and oil inspection board, empowered to prescribe standards for not over four grades of gasoline, is recommended to the North Carolina state legislature in the report of the Barker gasoline commission.

The report recommends that all pumps dispensing gasoline to the public in North Carolina bear a label stating the motor fuel dispensed therefrom meets the state specifications for premium, regular or low grade, as the case may be. The state inspection board would prescribe the form of such label.

A new definition of "gasoline", similar to that in the Illinois law, is recommended. The duty of inspecting gasoline and oil measuring devices should be transferred from the agriculture department, where it now is, to the inspection division, the report said.

The commission recommended enactment of a port of entry law, similar to those of Kansas and Nebraska, requiring trucks entering or leaving the state to pass through certain designated "ports". Similar requirements for railroads would be included.

Other provisions recommended included: registration of industrial users of naphtha and solvents; confiscation of condemned or bootleg products; more specific provisions covering fines, and punishments for violations; tightening the gasoline adulteration prohibitions; requiring the keeping of records for one year at service stations; inspection of books and records; and payment for samples taken by inspectors.

Richfield Offers A New Motor Oil

N. P. N. News Bureau

LOS ANGELES, Jan. 9.—Development of a new type lubricating oil is announced by Richfield Oil Co. Full-page newspaper advertisements, billboards, station banners and radio broadcasts last week told the Pacific Coast motoring public about the new product, which will be called New Richlube.

L. J. Grunder, of the Richfield automotive engineering department, outlined tests and experiments carried on by the company in developing this lubricant.

He said the oil industry's greatest problem has been to keep pace in lubricant manufacture with the rapid automotive engineering advances in recent years. New type bearings, through wear and abrasion, have been found to give off an acid that causes not only corrosion inside the motor but which increases accumulation of harmful sludge in the crankcase.

This problem, he said, was met by Richfield through a new distillation process and the addition to the oil of a newly invented and patented concentrate. When added to the new oil, this compound, it is said, deposits an irremovable film on the bearings which seals them against acid reaction and corrosion.

It is also claimed the new oil will act as a solvent for gum or carbon binder in the combustion chamber, will eliminate carbon from behind piston rings so they may function freely and also dissolves carbon from piston heads, valves and valve stems.

The new product will be marketed throughout the Pacific Coast at Richfield service stations only. It will be canned and is marked to sell at 25 cents a quart.

The Midwest Marketer

By E. L. BARRINGER, N. P N. Chicago News Bureau

CHICAGO, Jan. 11

Some service stations have been distinguished for signs cluttering lawns, curbs, strung over drives, and all over the building, in the hopes of coaxing motorists in to do some business.

Indianapolis, however, has called a halt to much of this sign nonsense because the City Plan Commission is enforcing an old zoning ordinance. The clean-up applies to stations in residential, apartment house and business zones, but not to industrial zones.

Last month the commission started in cleaning up all unlicensed signs, and the job is expected to be completed late this month.

The commission apparently is not too hard boiled about its duty, nor is it throwing out signs just because they are signs. The point seems to be to get rid of all the foolishness in these so-called merchandising stunts.

This is evident in a recent notice from the commission that appeals can be filed ten days before any meeting seeking the erection of unlicensed signs. The appeal is to be made in a letter including a drawing of the building, islands and lawn and location of proposed signs.

Indianapolis motorists no longer will mistake a simple service station for a street corner carnival.

* * *

Racing Fuels Barred

Oil men who follow the Indianapolis automobile races, and suppliers of petroleum products, will be interested in the fuel requirements for the race May. 31.

For three years gasoline consumption has been limited. This year the sky will be the limit, but—

The *but* is that only commercial gasoline can be used—no special motor fuels. Commercial gasoline, for the race, is defined as a gasoline sold for one year prior to May 1, 1937, under a trade or brand name, through regular outlets for consumption by automobiles.

The same gasoline must be used in qualification trials and in the big race, the American Automobile Association technical committee to be notified of the brand selected at least eight days before the trials.

For any driver interested in mileage, however, there is a special economy contest with a $2500 prize. Prize competitors will be limited to 45 gallons for the 500-mile race. Any time during the race, however, an entrant in the economy competition can change his mind by notifying the technical committee officials stationed in his pit.

* * *

A New Experiment

One of the most interesting service station price experiments since major oil companies last fall leased their company owned outlets, continues in Milwaukee with the spread between house brand and third grade gasolines amounting now to about 5.4 cents a gallon.

The interesting feature is that retailers have dared to break with the gasoline retail price tradition that, if the spread between second and third grades got "too big", the price inducement would increase third grade sales at the expense of house brands. The term "too big" was vague, never actually defined, but generally 2 cents was considered the maximum spread.

Results of this new price tradition, so far, have been rather astonishing. Evidently stations handling advertised second grade gasoline have not suffered loss in volume on this grade. Yet, third grade sales are reported to have increased. In one case sales of first and second grades through December was the same as had been forecast by the organization, but third grade sales volume was triple these forecasts.

Apparently a big spread has produced the result of second and first grade customers continuing to buy these grades, while price buying customers have given considerable volume of their patronage to branded stations rather than price selling outlets.

When retailers took over the Milwaukee market last September the new price situation began developing. First of all, retail prices stood pat while the dealer's cost price dropped 0.6 cent in two drops, thus producing 0.6 cent more gross profit.

Too Much Differential

Opinions of several retailers indicated that retailers probably would not have paid any attention to price sellers if the price sellers had maintained a slight differential, around 0.5 cent. But when price sellers were 2 cents below the retailer's third grade price, retailers played the price game in earnest by holding the price on first and second grades and "meeting competition" with third grade.

The theory was that the additional 0.6 cent gross profit on first and second grades increased income, that there was some merit in seeking the price buyers business and the only way to get it was to be competitive on price.

Several factors are in the background that explain these actions, with the third grade price sinking to 5.4 cents below second grade.

In the first place Milwaukee has had a price war, on and off, for about five years, so the present war is nothing new. Also, the majors in leasing stations did not alter the fundamental factors in the price wars.

The issue was, and still is, branded against unbranded and the differential. The unbranded sellers wanted a differential. The branded sellers have been unwilling to forego an investment in advertising.

The whole Milwaukee price situation has been thoroughly aired, through the state Department of Markets with its two minimum gasoline price orders, and in those orders the unbranded group was granted a 0.5 cent differential but no price signs to advertise at the curb this price advantage.

Strong Dealer Group

Furthermore Milwaukee probably has one of the most experienced, able and active retailer organizations of any city. at least in the middle west. Milwaukee retailers were prominent in the price order hearings, and through this experience the individual retailers and the organization has got its feet pretty well on the ground. A lot of the early enthusiasm, inherent in new organizations, has been tempered by cold realities, and Milwaukee retailers are aware of their responsibilities.

Another factor is that Milwaukee for years has been a happy hunting ground for a marketer with a real premium grade gasoline to sell. Years ago independent jobbers made major company competition squirm by selling "high test" gasoline at a fancy premium, and taking a lot of the business.

Several years ago when octane rating was so fashionable the quality of various grades pulled a little closer together. Now the swing is the other way, with a more evident difference in grades. Milwaukee marketers report that, while the 5.4-cent difference may seem big, yet the higher priced gasoline, on the whole, has a quality talking point.

Fighting Grade

When third grade gasoline was introduced in 1931 some marketers were of the opinion that this grade would "meet competition." In fact, some marketers called third grade a fighting grade. Yet, that hope never materialized. Oil companies clung to the idea that "too big" a spread would shift volume between grades, so when third grade price dropped generally second grade price followed.

Now Milwaukee retailers have turned to third grade as a "fighting grade." So far the experience seems to be favorable, proving that the price making brains of the industry might have been wrong in years past.

The experiment, however, has been conducted in the most favorable months, the months when better grade gasolines are required for winter driving. But what about next summer, when driving conditions will not be so favorable as they now are for better grades? Will motorists continue to keep on buying second and first grade gasolines?

The final answer probably will be available late next summer, when the experiment has run the cycle of all four seasons.

Kansans Convene February 15-16

KANSAS CITY, Jan. 6.—Kansas Oil Men's Assn. set the date yesterday for its annual exposition and convention Feb. 15-16 at Wichita. Opening on Monday morning, those at a distance will be able to drive to Wichita on Sunday. Announcement of further arrangements and program will be made later.

$1,000,000 a Year Cost to Tenn. Of Poor 'Gas' Tax Collections

NASHVILLE, Tenn., Jan. 11.—Inefficient gasoline tax collections cost Tennessee at least $1,000,000 annually, but in 9 months of investigating frauds and evasions, "gas" tax receipts increased $2,105,433.93. So three special attorneys and the chief auditor reported to Gov. Hill McAllister in concluding their investigation.

Personnel and methods of the state taxation department were severely criticized as largely responsible for the wide evasions of the tax.

Commissioner Dancey Fort, who recently resigned to accept an appointment from Gov. Hill McAllister to a circuit judgeship, "did not possess the necessary qualities for an executive position", the special investigators informed the governor.

"The lack of a strong hand at the helm was felt throughout the departmental operations. There also appeared to be two factions within the department, with consequent loss of efficiency," the report further declared.

During the nine months since the expose of the frauds and the suicide of W. H. Hill, supervisor of the tax division, the auditors and attorneys have investigated every phase of the evasions, frauds and inefficiency of the state agencies, their final report showed.

T. Coleman Andrews, of Richmond, Va., auditor, estimated the state's losses by evasion of the "gas" tax at $1,000,000 annually, chiefly through the illegal blending of taxed material with untaxed volatile substances to make a low grade gasoline.

The attorneys reported that approximately $50,000 had actually been collected from the dealers, and suits for more than another million dollars had been filed against evaders and against several large companies over controversial interpretations of the gas tax laws.

Norman Farrell, Jack Norman, and L. B. Loser, the three special attorneys appointed by Gov. McAllister, made their report prior to his retirement from office Jan. 15.

Loss Through Fraud

Frauds perpetrated by W. H. Hill, deceased, and Bob Dudley, the former inspector now granted immunity to testify for the state against the dealers involved in conspiracy charges, did not amount to more than $100,000, Auditor Andrews reported. Andrews said there was no proof available to show that Hill or Dudley shared the profits of the frauds with any other state employes.

Inefficiency, rather than fraud, is responsible for the greatest losses to the state department, the report declared.

Potential assessments for delinquent taxes amounting to $2,115,134.89 are open to the state by virtue of the audit, it is said.

The report recommended the elimination of kerosine inspectors as "political handouts" who did not attempt to perform the duties for which they were appointed.

Gasoline tax and inspection fees together increased for the year ending Nov. 11, 1936, in the amount of $2,856,736.78, as compared with the same period for 1935.

The investigation and audit of the "gas" tax division cost the state $57,012.62 up to Dec. 31, 1936, the report showed.

The report cited the 22 indictments returned against alleged evaders, of which two, G. G. Gean, of Halls, and J. H. Land, of Memphis, have been convicted in the first of the conspiracy trials.

Inefficiency Cited

Commenting on the inefficiency of Commissioner Dancey Fort and his former assistant, W. S. Booton, dismissed some weeks ago, the investigators declared: "We think Mr. Fort was at times negligent in his approval of bonds—in not terminating the permits of certain dealers and distributors as provided by the law—failure to press delinquents for payment."

The report concluded that, if Commissioner Fort, Booton, and Frank Broyles, director of the inspection unit, and other officials "had exhibited more diligence in inspecting, comparing, and checking the records and seeing that the inspection laws were enforced, certain of the frauds might have earlier been detected and prevented".

No evidence of criminality was found against either Fort or Booton, the latter handicapped by personnel differences and friction which prevented his giving full service. Neither is there evidence of any complicity of fraud on the part of Frank Broyles, the report showed. But he was charged with the direct responsibility of inspection forces, "and knew or should have known of their non-enforcement and the constant danger to which the state was thereby being subjected."

Loose and non-permanent records characterized the entire tax department, but later re-organization has instituted a new and modern accounting system, the report concluded.

Would Enlist Stations To Give "First-Aid"

N. P. N. News Bureau

CLEVELAND, Jan. 11.—A plan to enlist the service stations of the nation as first aid units to care for persons injured in auto accidents was brought to light here by Dr. Edwin W. Ryerson, a noted surgeon of St. Luke's Hospital, Chicago, during the convention of the American Academy of Orthopedic Surgeons.

The plan, still in the primary stages of development, was first introduced by the American College of Surgeons, as a means of caring for persons who are seriously injured until they can be taken to a doctor or hospital.

Dr. Ryerson said the only equipment necessary at the service station would be three sets of splints, for an arm, leg, and back. He said that, when an auto accident occurs, and there are serious injuries resulting, well-meaning helpers, in an effort to get the injured to a hospital, may cause infection, complete paralysis, or even death. He said that a great many persons have died or were permanently crippled because of improper or rough treatment before they reached hospitals.

"The American College of Surgeons is considering a plan to have proper splints and braces placed in filling stations along the highway and to have station attendants trained to handle injured people," Dr. Ryerson stated. "This will cost a lot of money, but it will be money well spent."

A. P. I. Meeting

LOS ANGELES, Jan. 9.—"Minimizing Disastrous Results of Earthquakes by Proper Design and Construction" is the title of a talk to be presented Jan. 12 before the Los Angeles Basin Chapter of the Division of Production, American Petroleum Institute, by Graham B. Moody, Standard Oil Co. of California.

C. J. Koberly, Kobe, Inc., will discuss "A Hydraulic Method of Pumping Oil Wells", and moving pictures and a lecture will outline industrial uses of the soy bean. This feature will be presented by F. W. Lawton, Ford Motor Co.

Dealers Organize Service Institute

INDIANAPOLIS, Jan. 11.—A service organization for Indiana retailers is being organized by Sam Hurd, Indianapolis, under the name of the Indiana Gasoline Dealer Institute. He says a substantial number of subscribers has been obtained from most of the larger cities in the state.

In the major cities and counties of large population the institute solicits subscriptions from more substantial service station operators. Smaller dealers are urged to join with the city or county association. A portion of each institute subscription is returned to the local organization for current expenses. It is planned that the chairman of the various city and county organizations will meet frequently to discuss matters of common interest. Many requests for service have concerned contracts with state government officials about laws and regulations applying to the retailer's business. The institute also plans to represent the legislative interests of its members.

Institute members are sent an identification card and bulletins are issued from time to time.

Mr. Hurd has been connected with petroleum marketing in Indiana for over 12 years and for many years he was secretary of the Indiana jobbers association. Later he was secretary of the gasoline tax evasion committee and of the state code committee. Commenting on the aims of the institute, Mr. Hurd said: "Already there are signs of improvement in salesmanship and a building up of good will that comes where the dealer actually sells the customer on the fact that the dealer now has a real and vital interest in each and every visitor to his driveway.

"Being in business for himself has lifted many an operator up to a higher plane, where he meets and sells his customer not only on his products but on the organization he is building up as a business for himself. He is a part of the business life of the community and he is accepting this responsibility.

"With individual groups in cities and counties all welded together in one state-wide organization much good will come from the medium of exchange of profitable ideas and the elimination of some of the unethical and bad practices which may have grown up in our industry in the past."

Plant Operators Discuss Tube Cleaning Problems

By **ALLEN S. JAMES**

SHREVEPORT, La., Jan. 9.—Sixty plant operators from the tri-state refining area adjacent to Shreveport sat around a big table in a banquet room of a hotel here the evening of Jan. 8 and discussed for more than two hours just one topic — Tube Cleaning Problems.

The occasion was the first of the 1937 series of monthly technical meetings sponsored by the La.-Ark.-Tex. division of the Western Petroleum Refiners Association. For three or four years now these meetings have been held monthly and their popularity was clearly shown at the meeting this evening when 60 operators attended despite the fact that sleet, ice and snow covered some of the roads from East Texas, and rain and fog covered most of northwestern Louisiana and southwestern Arkansas.

For this January meeting Secretary L. C. Grosjean brought down G. F. Ilgen from the Springfield, O., headquarters of the Airetool Manufacturing Co. Many of the operators already knew Mr. Ilgen because he has been in virtually every refinery in the country. And Mr. Ilgen apparently knew his audience for he stated before he started reading his paper that he was not concerning himself with tube cleaning theories; he was going to talk about the practical methods found from experience to be the quickest and most economical. He also invited the plant men to interrupt him at any time to ask questions. They did—countless times.

Type of Problem

Mr. Ilgen placed the tube cleaning problems in five: groups: (1) Cracking Coils, Pre-heater Tubes, Liquid Phase; (2) Vapor Phase and Polymerization; (3) Transfer Lines, Soaking Banks and Reaction Coils of Various Unit Types; (4) Hot Oil, Residuum and Tar Lines, and (5) Heat Exchanger Tubes with Crude Oil Throughput Exchanger Tubes for Vibrator Condenser, Natural Gasoline Condensers, Reboiler Tubes and Ammonia Condenser Tubes.

For Group No. 1 Mr. Ilgen said he had found that a high-speed motor of approximately 4000 r.p.m. operating a cutter head was most satisfactory. He warned that the cutter head should not be too heavy, and that too much weight due to centrifugal action should not be brought into contact with the tube walls. When the outlet tubes are badly coked and will not permit entrance of the cutter head, Mr. Ilgen suggested a universal joint and drill head, this combination not to be operated at more than 3000 r.p.m. with air pressure reduced to 75 lbs. This combination, he said, should be pushed through the tube as rapidly as possible, simply removing enough of the hard, flinty coke to permit entrance of the cutter head. Running the universal joint and drill through rapidly without attempting to work the combination back and forth practically eliminates tube injury, Mr. Ilgen said.

Effect of Wind

In some cleaning operations Mr. Ilgen said he had found that the prevailing winds had caused some rifleing due to the fact the loosened coke had not been blown out properly. He suggested that when such a condition appears that the cleaning out operation be reversed.

While vapor phase and polymerization processes differ widely the coke deposits are the same, being very thin and grey in color, and exceedingly hard. The coke sticks tightly to the tube walls and the metal actually is more ductile than the deposit.

In this type of cleaning job Mr. Ilgen said that cutters alone have a tendency to slide over the coke. The tubes may shine like a new rifle barrel, he said, yet not a particle of the coke be removed. When the cutters slide over the coke, he added, the friction causes heating to a high temperature and rapid wear. The recommendation here was a high speed motor with a combination cutter head consisting of cutters thrown out by centrifugal force and being led through the tube by a light weight universal joint and drill secured directly to the front end of the cutter head spider. This socalled "bull head" assembly, Mr. Ilgen said, is forced through the tube and the drill simply nicks the coke and permits the cutters to get in their work.

Cuts Cleaning Time

One plant operator spoke up at this point and said that he had been unable to get the cutters through the tube the first time without wearing out the cutter blades until he put on that "bull-head", and now he gets the job done all right. Another operator said this arrangement had cut down the cleaning out time 50 per cent at his plant by permitting him to do in one operation what he formerly had to do in two. Mr. Ilgen then added that without the drill leading the cutters the coke really acted as an abrasive and wore down the cutters at a rapid rate.

A powerful but moderate speed motor was recommended for the Group No. 4 work. Under-powered motors, Mr. Ilgen said, often cause the head to hang up with subsequent loss of time. He said a good method for loosening up such a cleaner is to shut off the air, pull on the operating hose as hard as possible and then bend it over the end fitting. Holding the hose in this matter the air should then be turned on full force as quickly as possible and repeating this operation several times will usually jar the motor and cutter free.

Steam was recommended as a motor operating medium in cleaning out tar and residuum lines, the steam tending to keep the deposit soft enough for it to flow out of the tubes with about the consistency of cream. A warning was stressed by Mr. Ilgen, however, in connection with the use of steam.

"Do not just stick a nipple in a hose, wrap a wire around it and expect it to hold," Mr. Ilgen stressed. "See that you have the proper type hose and the proper type couplings. Even then watch carefully to see that no oil seeps around the nipple and into the fabric of the hose and causes it to give way at that point."

Wash With Gas Oil

In cleaning heat exchanger tubes and similar equipment Mr. Ilgen said that when deposit was tarry it had been found advisable to keep the gum emulsified by washing out with gas oil.

Then there are cases where a lime deposit must be cleaned out. Mr. Ilgen told of one plant where a deposit of lime 1/32 inch in thickness had caused a heat transfer loss of 10 per cent. Small motors with flexible connections usually do the work satisfactory in these instances, he said.

In cleaning out deposits in gas lines Mr. Ilgen has found from experience that air driven motors are liable to cause sparks which ignite "gas pockets" and create a hazard to workmen. He urges in these cleaning jobs that a water driven motor be used.

And finally Mr. Ilgen got around to the matter of caring for the equipment. One of the best methods to prevent burning out of the motors and cutters, he said, was simply to provide the operator with a bucket of oil and have the man dip the unit into the bucket and let it drain a few minutes after it has been withdrawn from each tube.

At one refinery, Mr. Ilgen said, a six-months test was conducted. One motor unit was operated without oiling, the other was dipped in oil after each tube clean-out. The unoiled unit cost $14 in repairs and replacements in the six months period; the oiled one cost $3.

One refiner has a man who tests the motors and cutters after each job and makes minor repairs before they get serious. This practice, Mr. Ilgen said, was saving the company $4000 a year, according to figures given him by the plant manager.

Salt Water Disposal at Next Meeting

SHREVEPORT, La., Jan. 8.—The February meeting of plant operators in the La.-Ark.-Tex. division of the Western Petroleum Refiners Association, will be held at Kilgore on Feb. 12. Secretary L. C. Grosjean has announced that two or three men are now working on a general East Texas program centered to some extent around the salt water problem now becoming more acute in some plants in that area.

The March meeting, to be the second Friday in that month, will be held in Shreveport. W. T. Deacon, vice presdent of the St. Louis Surfacer & Paint Co., will discuss "Paints for the Oil Industry." The production and pipeline departments of the member refiners will be given special invitations to send as many of their men as possible to this meeting.

The April meeting, also the second Friday in that month, will be held at El Dorado, Ark. R. M. Heinie, chief chemist for L. R. Mackenzie, Inc., Des Moines, will speak on "Asphaltic Emulsions."

Refinery Workers' Wages are Higher

N. P. N. News Bureau

WASHINGTON, Jan. 11.—Index numbers compiled by the Bureau of Labor Statistics for November show upward curves for both employment and total payrolls in the petroleum refining industry, with the sharper rise of the latter indicating greater earnings for each worker in the industry as compared with the preceding month as well as with November a year ago.

Using as a base (100) the three-year average, 1923-1925, the Bureau fixed the November index for employment in the industry at 119.9, a rise of 2.5 over the figure for November, 1935, and only slightly under the October employment index of 120.6.

At the same time, total payrolls in November were 119.4, compared with 115.9 in October and 105.1 in November, 1935. Thus, while total employment has risen 2.5 points in the year, November to November, total payrolls have risen 14.3 points, showing larger paychecks per worker.

Oil Samples Exempt

N. P. N. News Bureau

WASHINGTON, Jan. 11.—Amending its regulations for transportation of explosives and other dangerous articles, the Interstate Commerce Commission has added a note exempting from provisions of the regulations samples of gasoline of one quart or less as sent by oil companies to state inspectors.

N. G. A. A. Meets April 28-30

N. P. N. News Bureau

TULSA, Jan. 9.—Natural Gasoline Association of America will hold its 1937 convention at Hotel Tulsa, April 28-30, announces William F. Lowe, secretary.

D. E. Buchanan, Hanlon-Buchanan, Inc., is chairman of the program committee now at work preparing for the meeting. Other members are S. C. Carney, Phillips Petroleum Co., Bartlesville; R. A. Carter, Continental Oil Co., Ponca City; D. B. Dow, Indian Territory Illuminating Oil Co., Bartlesville; H. W. Harts, Natural Gasoline Corp., Tulsa; W. E. Reardon, Coltexo Corp., Monroe, La. and D. W. Wolfe, Standard Gasoline Co., San Francisco.

Atlantic to Erect Koppers Unit for Gas Purification

PHILADELPHIA, Jan. 11.—The first Koppers phenolate gas processing unit in the east to be operated as a preparatory step for a polymerization plant is expected to be completed for Atlantic Refining Co. here in four months.

Atlantic's plant will be capable of recovering hydrogen sulfide from 22,000,000 cubic feet of refinery gas per day at 225 pounds pressure. It will be operated probably at the rate of 12,000,000 cubic feet of gas, it is understood. The sulfide accumulated by the process may be converted to sulfuric acid or disposed of in other ways.

Simultaneously Atlantic will try out the Girbitol process of gas purification at its new refinery at Atreco, Texas. This process is a development of the Girdler Corp., Louisville.

The Koppers system consists of an absorption stage and an activation stage through which only five to ten gallons the phenolate solution per thousand cubic feet of sour gas is circulated. The gas passes upward through bubble-cap trays in the absorber where it is stripped of 95 per cent of the sulfide. Contaminated solution, passing downward in the absorber, is passed through heat exchanger coils to the top of an activater, thence downward in countercurrent to stripping steam generated at the base, and is returned to the absorber through the heat exchanger shell and cooler.

Hydrogen sulfide laden steam passes to the dephlegmator shell and thence to the acid plant burner or other disposal point. Condensate from the dephlegmator returns to the activating column.

Fresh water is continuously added to the top tray of the absorber. The three top trays comprise, in effect, a water scrubber to recover chemicals which have been entrained or evaporated from the solution. It is necessary at intervals of several days to replenish chemicals lost. The caustic soda and crude phenols used in the process are said to be inexpensive.

A similar plant, the first to use this patented process, was erected by the Koppers Co. at El Segundo, near Los Angeles, for the Standard Oil Co. of Cal. It was put into operation Aug. 6, 1936.

A.P.I. Technical Group Appointed

N. P. N. News Bureau

NEW YORK, Jan. 11.—R. E. Haylett, Union Oil Co. of California, Los Angeles, has been appointed chairman for 1937 of the Central Committee on Refinery Technology of the American Petroleum Institute's Division of Refining. J. B. Rather, Socony-Vacuum Oil Co., New York, has been appointed 1937 chairman of the division's program committee. The appointments were made by W. S. S. Rodgers, of The Texas Co., New York, chairman of the divisional general committee and vice president of the institute.

Chairman Haylett has announced the appointment of 1937 chairmen of several topical committees of the Central Committee on Refinery Technology. They follow:

Automotive Survey Committee, E. W. Isom, Sinclair Refining Co., New York; Committee on Accident Prevention in Refineries, Glenn Byers, Shell Petroleum Corp., St. Louis; Committee on Corrosion of Refinery Equipment, Walter Samans, The Atlantic Refining Co., Philadelphia; Committee on Disposal of Refinery Wastes, John S. Hess, Sinclair Refining Co., New York; Committee on Fire Prevention in Refineries, C. E. Townsend, Sun Oil Co., Philadelphia; Committee on Motor Fuel Research, T. B. Rendel, Shell Petroleum Corp., Wood River, Ill.; Committee on Standardization of Refinery Equipment, Arthur E. Pew, Jr., Sun Oil Co., Philadelphia; and Committee on Testing Methods and Specifications, K. G. Mackenzie, The Texas Co., New York.

D. F. Gerstenberger Joins Alcorn

TULSA, Jan. 11.—D. F. Gerstenberger has been appointed district manager for the Mid-Continent area, representing Alcorn Combustion Co. Gerstenberger resigned as Mid-Continent manager for Universal Oil Products Co. to accept the new position.

Mr. Gerstenberger is universally known among western refiners, having represented Universal in that territory for several years. Prior to his association with his former company he was head of refining for American Refining Properties at Wichita Falls, and was especially active in development work on cracking in its various phases. He was one of the first, if not the first, of the technologists to combine the use of fractionating equipment with the operation of a Dubbs cracking unit, in which, in co-operation with others, he carried on pioneer investigations on plant-scale operation of this nature.

Gerstenberger will maintain headquarters in Tulsa and will handle the business of the Alcorn company, widely known in refining circles as combustion and furnace engineers and builders, throughout the Mid-Continent.

Antiknock Quest Was a "Foxhunt"

N. P. N. News Bureau

NEW YORK, Jan. 11.—Formal award of the William H. Perkin medal to Thomas Midgley Jr., vice president of Ethyl Gasoline Corp., was made Jan. 8 at the Chemists' Club. The medal was presented to Mr. Midgley "for distinguished work in applied chemistry, including development of antiknock motor fuels and safe refrigerants." The medal was presented by the American Section of the Society of Chemical Industry.

Presentation speech was made by Prof. M. T. Bogert of Columbia University, past president of the American Chemical Society. Mr. Midgley is now chairman of the board of directors of A. C. S.

The laboratory quest culminating in the discovery of tetraethyl lead was described by Mr. Midgley as a "foxhunt" when he received the medal.

Dr. R. E. Wilson, vice chairman of Pan-American Petroleum and Transport Co., spoke of "The Life and Accomplishments of the Medalist" attributing the use of higher compression engines, greater flexibility of automobile operation, and other advances" to him.

"Tetraethyl lead in motor fuels adds 50 times as much horsepower annually to American civilization as that which will be supplied by Boulder Dam," Dr. Wilson said.

To Build New Plant

WICHITA, Kans., Jan. 9.—Contract has been let for construction of a $65,000 refinery in Scott County, western Kansas. The plant will be built by the Winkler-Koch Engineering Co. and will operate on Scott County crude.

Gasoline Tank Car Bids Range From 4.375 to 11.71 Cents

WASHINGTON, Jan. 11.—The lowest maximum price in the Treasury Procurement Division's list of tank car gasoline contracts for the January-March quarter is 4.375 cents for G-101 (third grade) gasoline f.o.b. Rodessa, La. This contract went to Western Oil & Fuel Co., Minneapolis.

The highest price in any contract was 11.71 cents for V-75 (premium) gasoline delivered to the National Parks Service at Belton, Montana. This award went to The Texas Co., which will ship from Sunburst, Mont.

Socony-Vacuum Oil Co. and Shell Petroleum Co. both won several contracts at 5 cents f.o.b. their Kansas refineries for V-65 (regular) grade gasoline. Tansel Petroleum Co., Minneapolis, got a contract for Camp McCoy, Wisconsin, at 4.95 cents f.o.b. Overton, Texas, for V-65.

A number of contracts for delivery of V-65 gasoline at New England points were listed at less than 7 cents. However, in the tank wagon awards (See N. P. N. Dec. 30) there were several awards at less than 7 cents.

The TPD lists Derby Oil Co. as receiving several contracts for V-75 (premium) gasoline with maximum prices of 6.875 cents f.o.b. Wichita, Kansas.

Tabulated herewith are summaries of the TPD tank car gasoline contract awards for the January-March quarter for all regions except Region 6 (Pacific Coast), for which 12-month contracts were made last July. Gallonage figures are the TPD's estimate of total requirements to be purchased under the contract during the three-month period. The price listed is the maximum for each item which the government will have to pay.

Two methods of pricing are involved—based upon delivery at destination or f.o.b. the contractor's plant. When the contract specifies "f.o.b. destination," the contractor pays the freight from his refinery or bulk plant; such contracts are indicated by the word "destination," followed by the point from which shipment will be made.

When the contract specifies "f.o.b. bidder's bulk plant," the government will pay the freight from the contractor's refinery or bulk plant. This type of contract is indicated by listing under "f.o.b. point" the location from which the shipment will be made.

If the maximum prices exceed a price based on the contractor's posted bulk plant open market price on date of delivery, the government will be billed at the posted price (with or without freight, depending on type of contract).

All prices mentioned are exclusive of all federal, state and local taxes.

REGION ONE TANK CAR AWARDS, JANUARY-MARCH QUARTER

V-65 Grade

3-Month Gallonage	Govt. Agency	F.O.B. Point and Shipping Point	Max. Price	Contractor
7,200	QM, Ft. Preble, Me.	Portland, Me.	6.59	Shell
7,000	Chem. War. Service, Edgewood, Me.	Destination, Shipped from Baltimore, Md.	7.15	Texaco
48,500	QM, Fort Hoyle, Edgewood, Me.	Destination, Shipped from Baltimore, Md.	7.15	Texaco
90,000	QM, Ft. George G. Meade, Md.	Baltimore, Md.	6.6	Atlantic
74,500	Holabird QM Depot, Baltimore, Md.	Baltimore, Md.	6.49	Texaco
20,000	QM, Army Base, Boston, Mass.	Destination, Shipped from Chelsea, Mass.	6.615	Shell
59,000	QM, Fort Devons, Mass.	Destination, Shipped from Chelsea, Mass.	6.934	Shell
8,370	Nat'l Guard Bureau, Natick, Mass.	Destination, Shipped from Chelsea, Mass.	6.835	Shell
10,000	QM, Fort Monmouth, Little Silver, N. J.	Destination, Shipped from Warners, N. J.	6.67	Warner-Quinlan
30,000	QM, Carlisle, Pa.	Destination, Shipped from Baltimore, Md.	7.24	Texaco
8,000	New Cumberland Gen'l. Depot, New Cumberland, Pa.	Destination, Shipped from Baltimore, Md.	7.24	Texaco
55,500	QM, 21st and Johnston Sts., Philadelphia, Pa.	Philadelphia, Pa.	6.34	Shell
65,000	Municipal Airport, Pa.	Pt. Breeze, Philadelphia, Pa.	6.45	Atlantic
63,000	QM., Ft. Ethan Allen, CCC requirements, Vermont	Destination, Shipped from Burlington, Vt.	7.509	Shell
26,250	QM, Camp Dix, Wrightstown, N. J.	Destination, shipped from Warners, N. J.	7.06	Warner-Quinlan
28,000	Raritan Arsenal, Nixon, N. J.	Destination, shipped from Warners, N. J.	6.6	Warner-Quinlan
200,000	Naval Air Station, Lakehurst, N. J.	Destination, shipped from Warners, N. J.	6.93	Warner-Quinlan
7,000	QM, Ft. Hancock N. J.	Destination, shipped from Warners, N. J.	6.73	Warner-Quinlan
15,000	N. Y. Port of Embarkation, Brooklyn, N. Y.	Destination, shipped from Sewaren, N. J.	7.132	Shell
19,450	QM, Ft. Ontario, Oswego, N. Y.	Destination, shipped from Syracuse, N. Y.	7.686	Shell
10,000	QM, Plattsburg Barracks, Plattsburg, N. Y.	Destination, shipped from Rensselaer, N. Y.	8.058	Shell
6,000	Schenectady Genl. Depot, Schenectady	Destination, shipped from Rensselaer, N. Y.	6.903	Shell

V-75 Grade

21,000	Aberdeen Proving Ground, Aberdeen, Md.	Destination, Shipped from Baltimore, Md.	9.1	Texaco
8,000	Delaware Ordnance Depot, Pedricktown, N. J.	Destination, shipped from Marcus Hook, Pa.	8.88	Texaco
19,500	Picatinny Arsenal, Picatinny, N. J.	Destination, shipped from Bayonne, N. J.	9.08	Texaco
35,000	U. S. Military Academy, West Point, N. Y.	Destination, shipped from Bayonne, N. J.	8.78	Texaco
21,000	QM, Ft. Ontario Oswego, N. Y.	Destination, shipped from Albany, N. Y.	9.45	Texaco
26,000	QM, Plattsburg Barracks, Plattsburg, N. Y.	Destination, shipped from Albany, N. Y.	9.75	Texaco

G-101 Grade

75,000	U. S. Engrs., Eastport, Me.	Bangor, Me.	7.09	Shell
49,000	Aberdeen Proving Ground, Aberdeen, Md.	Destination, Shipped from Baltimore, Md.	6.81	Sinclair
10,000	QM, Fort Monmouth, Little Silver, N. J.	Destination, Shipped from Sewaren, N. J.	6.236	Shell
7,000	Frankford Arsenal, Bridesburg, Pa.	Marcus Hook, Pa.	5.95	Texaco

REGION TWO TANK CAR AWARDS

V-65 Grade

3-Month Gallonage	Govt. Agency	F.O.B. Point and Shipping Point	Max. Price	Contractor
43,000	QM, Ft. McClellan, Ala.	Shreveport, La.	5.24	West. Oil & Fuel Minneapolis
40,000	QM, Maxwell Field, Ala.	Mobile, Ala.	6.25	Texaco
80,000	TVA Wilson Dam, Ala.	Shreveport, La.	5.24	West. Oil & Fuel Minneapolis
25,000	U. S. Engrs., Bridge Junction, Ark.	Arkansas City, Kans.	5.0	Shell
53,375	CCC—QM Barrancas, Fla.	Destination, Shipped from Pensacola, Fla.	6.6	Texaco
30,000	U. S. Engrs., Ocala, Fla.	Tampa, Fla.	6.75	Texaco
6,500	U. S. Penitentiary, Atlanta, Ga.	Shreveport, La.	5.24	West. Oil & Fuel Minneapolis
362,500	CCC—QM, Ft. Benning, Ga.	Shreveport, La.	5.24	West. Oil & Fuel Minneapolis
105,000	CCC—QM, Ft. McPherson, Ga	Shreveport, La.	5.24	West. Oil & Fuel Minneapolis
25,000	CCC—QM, Ft. Oglethorpe, Ga.	Shreveport, La.	5.24	West. Oil & Fuel Minneapolis
124,000	QM, Barksdale Field, Shreveport, La.	Shreveport, La.	5.25	Home Oil Co. Vicksburg, Miss.
23,000	Soil Conservation Service, Meridian, Miss.	Shreveport, La.	5.24	West. Oil & Fuel Minneapolis
8,000	U. S. Cotton Breeding Field, St., Stoneville, Miss.	Shreveport, La.	5.24	West. Oil & Fuel Minneapolis
132,000	CCC—QM, Ft. Bragg, N. C.	Destination, Shipped from Wilmington, N. C.	7.84	Texaco
6,500	Ordnance Depot, North Charleston, S. C.	Destination, shipped from Charleston, S. C.	6.635	Texaco
50,000	QM, Accotink, Va.	Baltimore, Md.	6.49	Texaco
80,000	Marine Barracks, Quantico, Va.	Destination, Shipped from Baltimore, Md.	7.38	Texaco
25,000	QM, Langley Field, Va.	Norfolk, Va.	6.49	Texaco

V-75 Grade

115,000	Marine Barracks, Quantico, Va.	Destination, Shipped from Baltimore, Md.	9.13	Texaco
8,000	Nansemond Ordnance Depot, Pig Point, Va.	Norfolk, Va.	8.34	Texaco

G-101 Grade

66,000	QM, Ft. Oglethorpe, Ga.	Rodessa, La.	4.375	West. Oil & Fuel Minneapolis

REGION THREE TANK CAR AWARDS

V-65 Grade

40,000	Qm Depot, Chicago, Ill.	Whiting, Ind.	6.14	Standard of Ind
58,000	CCC—QM Ft. Sheridan, Ill.	Whiting, Ind.	6.14	Standard of Ind.
50,000	QM Chanute Field, Rantoul, Ill.	Whiting, Ind.	6.14	Standard of Ind.
25,000	Arsenal, Rock Island, Ill.	Shreveport, La.	5.2	Home Oil Co. Vicksburg, Miss.
10,000	Ordnance Proving Ground, Savanna, Ill.	Wood River, Ill.	5.83	Standard of Ind.
20,000	QM, Scott Field Belleville, Ill.	Wood River, Ill.	5.83	Standard of Ind.
40,000	Naval Training Station, Great Lakes, Ill.	Whiting, Ind.	6.14	Standard of Ind.
58,000	QM, Ft. Benjamin Harrison, Ind.	Shreveport, La.	5.2	Home Oil Co. Vicksburg, Miss.

(*Continued on page* 32d)

3-Month Gallonage	Govt. Agency	F.O.B. Point and Shipping Point	Max. Price	Contractor
31,600	CCC—QM Ft. Des Moines, Iowa	Arkansas City, Kans.	5.0	Shell
8,000	U. S. Engrs., Mondamin, Iowa	Augusta, Kans.	5.0	Socony-Vacuum
65,000	QM Ft. Knox, Ky. CCC Motor Pool Included	Sand Springs, Okla.	5.0	Sinclair
24,000	QM Camp Custer, Mich.	Shreveport, La.	5.2	Home Oil Co. Vicksburg, Miss.
60,000	QM Selfridge Field, Mt. Clemens, Mich.	River Rouge, Mich.	7.49	Standard of Ind.
24,000	Nat. Guard Bureau, Little Falls, Minn.	Minneapolis, Minn.	5.587	Radke Ind. Oil Co., New Ulm, Minn.
16,000	Red Lake Indian Agency, Redby, Minn.	Minneapolis, Minn.	5.587	Radke Ind. Oil Co., New Ulm, Minn.
7,000	QM Jefferson Barracks, Mo.	Wood River, Ill.	5.83	Standard of Ind
25,000	U. S. Engrs., Ft of Arsenal St., St. Louis, Mo.	Wood River, Ill.	5.83	Standard of Ind.
40,000	U. S. Engrs., Protection, Mo.	Arkansas City, Kans.	5.0	Shell
100,000 (Total)	U. S. Engrs., Kansas City, Mo.			
	Rule, Neb.	Augusta, Kans.	5.0	Socony-Vacuum
	St. Joseph, Mo.	Augusta, Kans.	5.0	Socony-Vacuum
	Glasgow, Mo.	Augusta, Kans.	5.0	Socony-Vacuum
	Napoleon, Mo.	Augusta, Kans.	5.0	Socony-Vacuum
	Waverly, Mo.	Augusta, Kans.	5.0	Socony-Vacuum
	Jefferson City, Mo.	Sand Springs, Okla.	5.0	Sinclair
	Gasconade, Mo.	Sand Springs, Okla.	5.0	Sinclair
60,000	Rosebud Indian Agency, Crookston, Neb.	Arkansas City, Kans.	5.0	Shell
30,000	Pine Ridge Indian Agency Rushville, Neb.	Destination, Shipped from Casper, Wyo.	8.49	Socony-Vacuum
17,000	CCC-QM Ft. Crook, Neb.	Augusta, Kans.	5.0	Socony-Vacuum
22,000	QM Omaha, Neb.	Augusta, Kans.	5.0	Socony-Vacuum
15,000	U. S. Engrs., Omaha, Neb.	Augusta, Kan.	5.0	Socony-Vacuum
12,000	Turtle Mt. Indian Agency, Belcourt, N. D.	Augusta, Kan.	5.0	Socony-Vacuum
16,000	U. S. Industrial Reformatory Chillicothe, O.	Shreveport, La.	5.2	Home Oil Co., Vicksburg, Miss.
76,000	QM Ft. Hayes, Columbus, Ohio	Shreveport, La.	5.2	Home Oil Co., Vicksburg, Miss.
8,000	QM Osborn, Ohio	Shreveport, La.	5.2	Home Oil Co., Vicksburg, Miss.
8,000	Material Division, Wright Field, Ohio	Shreveport, La.	5.2	Home Oil Co., Vicksburg, Miss.
14,000	QM Camp McCoy, Wis.	Overton, Tex.	4.95	Tansel Petro. Co. Minneapolis
8,000	QM Columbus Gen'l Depot, East Columbus, Ohio	Shreveport, La.	5.2	Home Oil Co., Vicksburg, Mis

V-75 Grade

8,000	U. S. Engrs., Keokuk, Iowa	Wichita, Kans.	6.875	Derby Oil Co., Wichita, Kans.
16,000	U. S. Engrs., Le Clair, Iowa	Wichita, Kans.	6.875	Derby Oil Co., Wichita, Kans.
200,000	QM, Ft. Knox, Ky.	Wichita, Kans.	6.875	Derby Oil Co., Wichita, Kans.
8,000	Veterans Administration, Chillicothe, Ohio	Arkansas City, Kans.	6.86	Kanotex Ref. Co. Arkansas City, Kans.

G-101 Grade

20,000	QM Depot, Jeffersonville, Ind.	Rodessa, La.	4.375	Western Oil & Fuel, Minneapolis
32,000	QM Ft. Snelling, Minn.	Minneapolis, Minn.	4.813	Radke Ind. Oil Co., New Ulm, Minn.
27,511	CCC Jefferson Barracks, Mo.	Wood River, Ill.	5.47	Standard of Ind.

REGION FOUR TANK CAR AWARDS

V-65 Grade

13,300	QM, Ft. Leavenworth, Kans.	Augusta, Kans.	5.0	Socony-Vacuum
35,000	QM, Ft. Riley, Kans.	Augusta, Kans.	5.0	Socony-Vacuum
75,000	U. S. Engrs., Newkirk, N. Mex.	El Paso, Tex.	5.625	Standard of Texas
8,000	Chas. H. Burke Indian School, Wingate, N. Mex.	El Paso, Tex	6.355	Standard of Texas
14,000	QM., Ft. Reno, Okla.	Destination, Shipped from Cushing, Okla.	6.391	Deep Rock
175,000	Field Artillery School, Ft. Sill, Okla.	Destination, Shipped from Grandfield, Okla.	6.01	Bell Oil & Gas, Tulsa, Okla.
35,000	QM, Brooks Field, Tex.	Destination, Shipped from San Antonio, Tex.	6.975	Texaco
14,000	QM Duncan Field, Tex.	Destination, Shipped from San Antonion, Tex.	6.975	Home Oil Co., Houston, Tex.
58,500	CCC QM, Ft. Bliss, Tex.	El Paso, Tex.	7.37	Texaco
21,000	QM, Ft. Brown, Brownsville, Tex.	Destination, Shipped from Brownsville, Tex.	7.5	Texaco
16,000	QM, Ft. McIntosh, Laredo, Tex.	Destination, Shipped from San Antonio, Tex.	7.78	Texaco
175,000	QM, Ft. Sam Houston, Tex.	Destination, Shipped from San Antonio, Tex.	6.975	Home Oil Co. Houston, Tex.
50,000	QM, Ft. Crockett, Galveston, Tex.	Texas City, Tex.	6.05	West. Oil & Fuel Minneapolis
13,000	QM, Air Corps, Kelly Field, Tex.	Destination, Shipped from San Antonio, Tex.	6.975	Texaco
20,000	QM, Ft. D. A. Russell, Tex.	Destination, Shipped from El Paso, Tex.	7.67	Texaco
119,000	QM, Randolph Field, Tex.	Destination, Shipped from San Antonio, Tex.	6.975	Home Oil Co. Houston; Tex.
28,000	Normoyle QM Depot, San Antonio, Tex.	Destination, Shipped from San Antonio, Tex.	6.975	Home Oil Co. Houston, Tex.
45,000	Bur. of Reclamation, Beverly, Tex.	Gladewater, Tex.	5.0	Bell Oil & Gas, Tulsa, Okla.

V-75 Grade

8,450	QM, Ft. Leavenworth, Kans.	Wichita, Kans.	6.875	Derby Oil Co., Wichita, Kans.
14,000	QM, Brooks Field, Tex.	Destination, Shipped from Ingleside, Tex.	8.975	Home Oil Co. Houston, Tex.
125,000	QM, Ft. Bliss, Tex.	El Paso, Tex.	9.37	Texaco
105,000	QM, Ft. Sam Houston, Tex.	Destination, Shipped from San Antonio, Tex.	8.975	Texaco
8,000	WM, Ft. D. A. Russell, Tex.	Destination, Shipped from El Paso, Tex.	9.67	Texaco
6,500	Ordnance, San Antonio, Tex.	Destination, Shipped from Ingleside, Tex.	8.975	Home Oil Co. Houston, Tex.

REGION FIVE TANK CAR AWARDS

V-65 Grade

57,000	Fitzsimmons Gen'l. Hospt., Bunell, Colo.	Augusta, Kans.	5.0	Socony-Vacuum
21,000	QM, Ft. Logan, Colo.	Augusta, Kans.	5.0	Socony-Vacuum
25,000	Blackfeet Indian Agency, Ft. Browning, Mont.	Portland, Ore.	5.5	Stand. of Calif.
30,000	Yellowstone Nat'l Park, Gardiner, Mont.	Portland, Ore.	6.0	Stand. of Calif.
125,000	U. S. Engr., Ft. Peck, Wiota, Mont.	Augusta, Kans.	5.0	Socony-Vacuum
63,000	QM, Ft. Francis E. Warren, Wyo.	Destination, Shipped from Casper, Wyo.	7.94	Socony-Vacuum

V-75 Grade

8,000	Nat'l. Park Service, Belton, Mont.	Destination, Shipped from Sunburst, Mont.	11.71	Texaco
8,000	Nat'l. Park Service, Glacier Park, Mont.	Portland, Ore.	7.5	Stand. of Calif.
16,000	Indian Field Service, Poplar, Mont.	Wichita, Kans.	6.875	Derby Oil Co. Wichita, Kans.
10,000	Rocky Boy's Indian Agency, Box Elder, Mont.	Destination, Shipped from Sunburst, Mont.	11.55	Texaco

G-101 Grade

84,000	Bur. of Reclamation, Grand Junction, Colo.	Destination, Shipped from Craig, Colo.	8.85	Texaco

Tax May Include Private Trucks

INDIANAPOLIS, Jan. 11.—Opposition to an attempt to apply the weight tax of common carrier trucks to private trucks was expected from private truck interests in Indiana as the legislature convened this week for the 1937 regular session.

Extension of the present tax of 60 cents per hundredweight on common and contract carrier trucks light, to include private trucks is expected, or else it is believed a new tax based on tire width in place of the weight tax will be proposed for all types of trucks.

Private truck interests are organizing to oppose this new taxation.

Private truck taxation is expected as a result of last year's highway commission surveys. The Indiana Highway Survey Commission, five members from the house, five from the senate, and five appointed by the governor, was authorized by the 1936 special legislature. During last summer the commission conducted hearings throughout the state, for suggestions on highway improvements.

Since the hearings Earl Crawford, secretary to the former governor and chairman of the survey commission, has been quoted in newspapers as telling service luncheon clubs that he favors inclusion of all private carriers under the weight tax.

* * *

Another legislative proposal anticipated in Indiana is to give the Public Service Commission control of highways to direct truck movements. Under this proposal highways could be closed to trucks when heavy traffic is anticipated, such as athletic games and so on.

* *

A 48-hour week for truck drivers is expected to be considered by the Indiana legislature.

This proposal is regarded as a union measure, and is reported to be backed by public opinion as numerous truck accidents have been charged to drivers falling asleep.

New Czech Refinery

WASHINGTON, Jan. 11.—Construction of a new refinery at Dubova, Czechoslovakia, is nearing completion, according to the Commerce Department. Reports are that equipment to be installed will be of domestic manufacture only. Total costs will be approximately $1,750,000.

The new refinery will be under management of the Directorate of State Mines and Iron Works in nearby Pedbrezova and will process crudes from state-owned wells at Gbely, where oil reserves sufficient for 20 to 30 years are said to exist.

It is planned to also manufacture fuel oils at the state-owned refinery by hydrogenation or by low-temperature fractionation, it is said.

Markets

Uncertainty Over Crude Outlook Unsettles Markets

N. P. N. News Bureau
CLEVELAND, Jan. 11

OIL markets were fairly active the first week of 1937 despite the feeling of uncertainty due to failure of major buyers to meet the higher crude prices posted by Continental Oil Co.

Another sharp decline in natural gasoline prices, continued search for kerosine in most districts, and increased demand for lubricating oils served to keep trade interest high. Refined gasoline attracted only nominal interest, although warm weather in some areas pushed consumption above seasonal levels.

Traders were in a quandry over the question of crude prices. Complete silence on the part of major buyers as to their attitude toward crude prices was unsettling. Before the turn of the year, many traders had expressed the belief that Continental's proposed 17-cent advance was too much. But they had expected other buyers to go part way—perhaps 10 or 12 cents—in recognition of the firm crude market.

Thus, traders did not know what course of action to follow. Failure to recognize the possibility of an advance in the near future by staying out of the market might prove costly to the buyer. The seller did not want to push sales and find prices higher when his tanks were empty.

Despite buyer hesitancy on some products, there was no lack of demand for kerosine in most districts. In many cases spot quotations were largely nominal. Some refiners had difficulty obtaining enough oil to supply their contract customers. Others hesitated to make commitments until they knew the outcome of the crude situation.

The apparent shortage of kerosine along the eastern seaboard was reflected in a 0.25-cent advance in tank car and barge prices by some suppliers from Jacksonville north to Portland and at some inland terminals. Other suppliers did not change their prices.

Western Pennsylvania refiners benefited from the tight position of kerosine along the seaboard. Some were getting orders from customers they had not been able to supply since last winter.

An unusual sale of kerosine was reported in the Mid-Continent. Several companies were buying kerosine for shipment to the Gulf Coast. They took virtually all available kerosine from East Texas and Louisiana plants, mostly at 4 cents. One company—anxious for material—went into North Texas for supplies, disregarding the freight disadvantage of buying in that district for shipment to the Gulf.

Moving in the opposite direction of kerosine, natural gasoline supplied considerable trade interest. Natural gasoline manufacturers still had trouble finding a home for their product. Production was increasing, while refinery use of natural still was curtailed. Refiners had cut down blending operations when natural went to 4.75 cents in Oklahoma last November.

While there were some signs that blending operations were being resumed last week, demand was not yet sufficient to forestall a drop of 0.5 cent, to 3 cents in Oklahoma and 2.75 cents in Texas. As the week ended, however, some traders expressed belief that the downward trend in prices had about run its course.

Pennsylvania lubricating oils responded to the previous week's advance in Pennsylvania grade crude prices. Both neutrals and bright stock worked higher as supplies became tighter. Most refiners of Pennsylvania crude view the outlook for lubricating oils with considerable optimism, and apparently for good reason. Bright stock was in unusually good position at the year-end, considering the season. It was due, however, to the steady demand from exporters throughout most of 1936.

Mid-Continent bright stock manufacturers also benefited from foreign demand. Last week many suppliers had raised their quotations although higher prices were not general today.

Mid-Continent

Kerosine Active

N. P. N. News Bureau
TULSA, Jan. 9

The Mid-Continent market staged a three-ring circus the past week, with gasoline, kerosine and natural gasoline the featured attractions. Other products had their moments, but these three headliners held most of the attention. Strikes, advancing bright stock prices, curtailed natural output in Rodessa were listed as the supporting cast.

Natural gasoline was the most spectacular of the three. A nose-dive of 0.5 cent in prices climaxed the show.

Refinery use of natural gasoline, curtailed when prices became "prohibitive", continued light the first week of January. Natural gasoline manufacturers found it exceedingly hard to attract business at current prices. In their attempts to stimulate buying several sellers reduced prices 0.25 cent. Temporary relief was obtained. But within a day or two manufacturers again were pushing sales. By the end of the week, Grade 26-70 prices hit 3 cents in Oklahoma and 2.75 cents in Texas. Even at those prices, orders were limited.

Lower prices did stimulate jobber buying interest. Twelve-pound stabilized natural was offered in small quantities at prices that figured as much as 1.375 cent below prices for refined motor fuel of like value. Jobber business, however, failed to take up any slack in offerings. It did offer an outlet for the more insistent sellers.

Output of natural gasoline in the Rodessa field was curtailed considerably last week when a new conservation order went into effect. Output at some plants was reduced as much as 50 per cent by the new order. It was reported at least one plant was completely shut down.

Directly affected by low-priced natural gasoline, refined motor fuels were unsteady. One supporting factor was the possibility of a general crude price advance. But since no announcement to that effect has been made, observers believed refiners next week would begin disposing of accumulated gasoline. Several refiners who attempted to sell gasoline in the Standard of Indiana marketing territory last week reported competition was unusually keen.

Following a week or two of inactivity, East Texas gasoline last week began moving to the Gulf Coast again. At least 400 cars were bought by large companies. This buying relieved conjested storage at several plants. Another sale of 1,000,000 gallons of 375 e.p. naphtha was reported for Gulf Coast shipment. Previous to this buying, prices for 400 e.p. gasoline slumped to 4.625 cents, f.o.b. plant.

Offerings of "no-octane" gasoline from Rodessa were expected to decrease considerably over the next week or two. Reports indicated new Rodessa conservation order was curtailing volume of crude available to several local refiners. With crude scarcer, output of gasoline at several Rodessa plants was expected to drop sharply.

Kerosine was the most active product in the Mid-Continent. Supplies were limited in most districts. Inquiry for kerosine for shipment to the Gulf Coast was especially brisk. This type of business cleared East Texas and Louisiana of virtually all available kerosine.

At least five companies had placed standing orders for kerosine in East Texas and Louisiana at 4 cents. In its search for more kerosine, one company disregarded freight barriers and purchased supplies in North Texas. It is

unusual for North Texas products to move to the Gulf Coast due to freight disadvantages. Many Oklahoma refiners were storing kerosine for use next spring as tractor fuel.

Some refiners who were heavy shippers of petroleum products to industrial concerns in the north, indicated they too had felt the affects of strikes.

Stimulated by increased export demand and a rising market in Pennsylvania, several Mid-Continent suppliers advanced bright stock prices 0.5 cent late in the week. Sluggishness in the domestic market was more than offset by active buying on the part of exporters. Where formerly inquiries called for blending stocks in bulk, new orders were specifying shipment of blended oils in drums. Apparently foreign buyers desire lubricating oil for immediate distribution in containers easily transported. This export demand has resulted in advances of 0.5 cent in export prices by one or two sellers.

Wax, sometimes used in munition factories, was in brisk demand and more sales were made at 2.625 cents f.o.b. plant. Occasional lots could be obtained at 2.5 cents.

Chicago

Gasoline Easy

N. P. N. News Bureau
CHICAGO, Jan. 9

Market activity the first week of 1937 was a surprise to many traders and a disappointment to others in the Mid-Western market.

While many traders here had decried the crude advance when it first was announced by Continental Oil Co. early in December, they had gradually changed their opinions as the year ended. The majority had expected major purchasers to make an announcement early in January. So far large crude buyers have not met the advance, nor have they expressed opposition to higher prices. As a result market trading was unsettled throughout the week.

Easiness of natural gasoline prices, which have dropped 1.75 cents since Dec. 15, was reflected in Mid-Western refined gasoline market last week. The natural product took much of the play away from refined gasoline. Volume of 26-70 and stabilized grades moving to jobbers the first week of the year was substantially heavier, and was growing, traders said, as the natural market declined.

With natural cutting into its volume, more refined gasoline was available and prices ruled easy most of the week.

Full specification low octane U. S. Motor was generally offered 0.125 cent lower Jan. 7, and offerings later in the week shading this figure were heard.

Weakness of gasoline was not confined to low octane grade or natural. More offerings of 63-67 and 68-70 octane grades were encountered. Higher octane grades, obtained by blending with natural, were reported available at shaded prices at times. The majority of offerings of these grades, however, were held at least for the lows of price ranges.

Retail markets were stable as they embarked on their first new year under the dealer plan of marketing.

Kerosine started out 1937 in good position with steady prices. A virtual scarcity of this product was reported in many quarters. The majority of open market kerosine sales, it was reported, were purchased as fuel for range burners. Prices were 0.125-cent higher on 41-43 w.w. and 42-44 w.w. grades last week.

Coastal

Prices Steady

N. P. N. News Bureau
NEW YORK, Jan. 9

Gulf Coast cargo markets continued bullish on most products during the past week, although actual open market sales were lacking. Traders generally said they were still reluctant to commit themselves until the crude oil situation is cleared up.

As the week ended, larger crude oil purchases had not met the 17-cent advance in Mid-Continent crude posted Jan. 4 by Continental Oil Co. The topic of "to raise or not to raise" overshadowed the Gulf cargo markets through the week, and, in the opinion of many traders, was hampering open cargo selling. Many reported receiving inquiries for spot cargoes of gasoline, kerosine and fuel oils but were uncertain how to quote.

Reports persisted that several cargoes of gas oil were sold at the Gulf for export movement but these reports could not be confirmed. The price was reported to be 4 cents a gallon, a price paid during the preceding week for one or two cargoes. While no definite check could be obtained as to the quantity of kerosine and gas oil sold within the past three weeks for export movement from the Gulf, traders reported the quantity apparently was large and had, together with domestic demand, kept the Gulf well cleared of these products. Oil workers' strikes in Venezuela were reported to have curtailed refinery operations there and forced some companies to look to the American Gulf for oil to replace Venezuelan products in foreign markets.

Wax

Scale Steady

N. P. N. News Bureau
NEW YORK, Jan. 9.—Scale wax markets were steady during the week ended Jan. 9. No unusual activity was noted, but demand was fair.

Suppliers still were not pushing sales and little change was apparent in prices. Some sales of 124-126 white crude were reported at 2.45 to 2.5 cents, but most traders said that offerings at the lower price were less frequent. Only a few refiners in the Pennsylvania field were said to have any wax available for prompt shipment.

Fully refined waxes showed no changes.

Pennsylvania

Lube Prices Up

N. P. N. News Bureau
CLEVELAND, Jan. 9

Responding to the recent advance in Pennsylvania grade crude and to a fairly active demand, lubricating oil prices worked higher in the Pennsylvania market the first week of 1937. Kerosine prices also were higher on increased activity.

Gasoline reflected the seasonal drop in consumption. Inventories at most plants were not increasing more than seasonally. Fuel oil was a bit freer. Some refiners were asking higher prices for wax.

Faced with increased costs as the result of the advance in crude the last week of 1936, virtually all refiners advanced spot quotations on neutral oils 0.5 cent. Spot offerings remained fairly scarce. Sellers reported that buyers were absorbing offerings almost as soon as they were put on the market.

Establishment of higher prices for neutral came as a surprise to some traders despite its recent tight position. They said that most of the buying for the season had been done; and expected that offerings would tend to increase.

An opposite viewpoint was that with the increased use of lighter oils the drop in demand in the spring would not be as sharp as in previous years. It was pointed out that neutrals were fairly firm most of last summer.

Increased buying of bright stock, mostly by refiners in need of additional supplies, was largely responsible for the higher prices for that oil. Some of the larger refiners were buying either to fill export orders or for their own motor oil blends.

At least one refiner did not advance bright stock and, as the week ended, still was quoting 20.5 cents for 25 pour test, No. 8 color oil compared with a majority of quotations of 21 cents. Most traders believed the 21-cent quotation would be unanimous within a few days.

Demand for 600 steam refined and some of the higher flash stocks has been running ahead of supply for some time. Most sellers, therefore, were asking, and getting about 0.5 cent more for 600 steam refined, 650 steam refined, and 600 flash stock than in the previous week. Several sales at the higher prices were reported.

Reflecting the tight position of kerosine in other districts, demand for this oil spurted the past week. Bradford-Warren district refiners were benefiting from an active demand from western New York. Refiners from Titusville, south were getting orders both from eastern Pennsylvania and, in some instances, from western Ohio and eastern Indiana. With an expanding marketing territory, sellers advanced their prices at least 0.125 cent.

Prices of 36-40 fuel oil were unchanged although offerings increased slightly. Demand for this grade of burning oil has not been maintained as well as had been expected. One industrial plant, which has been using 36-40 fuel oil regularly, switched to gas because of the high price for the fuel oil.

Several refiners were holding their wax for higher prices. Spot offerings were fairly scarce, reports indicated.

Fuel Oil PRICES HIGHER ALONG EASTERN SEABOARD

Eastern

Kerosine Firm

N. P. N. News Bureau

NEW YORK, Jan. 9

● Kerosine continued firm through the eastern marketing territory last week, despite lower tank wagon and tank car demand caused by warm weather. Open market prices still were nominal due mostly to lack of oil available. However, jobbers apparently were carrying their storage at near maximum levels and were not heavy buyers, suppliers said.

Tank car and barge kerosine prices were advanced 0.25 cent, at seaboard terminals from Jacksonville north to Portland by numerous suppliers toward the end of the week. Other suppliers had not met the higher prices as the week ended. Tank car prices also were advanced 0.25 cent at inland terminals through New York and New England by many suppliers. Tank wagon prices of kerosine were advanced 0.5 cent by Atlantic Refining Co. through Pennsylvania and Delaware on Jan. 7.

Tank car gasoline markets were stable during the week with no changes reported in prices. Demand was reported moderately active and suppliers indicated stocks were not excessive along the Atlantic coast. Many were bringing up only enough gasoline from the Gulf to maintain a safe working level and keeping the remainder of their storage filled with kerosine and light fuel oils.

Service station gasoline prices were advanced at many points in New York and New England, to meet the advances of 0.2 to 0.3 cent a gallon in tank wagon prices to dealers Dec. 28, according to traders reports. However, at some points, including metropolitan New York City, there were no changes in retail prices.

Unsettled service station markets were reported through some sections of New Jersey, particularly in Hudson, Essex and Union counties. Reports were that some stations were selling regular grade gasoline at 13 cents a gallon, including state and federal taxes.

California

Fuel Oil Firm

N. P. N. News Bureau

LOS ANGELES, Jan. 8

● Firmness of all fuel and gas oil quotations, with an advance of from 10 to 20 cents a barrel on certain grades, was a feature of Pacific Coast petroleum markets the past week.

Frosts over wide sections of southern California caused an unusual demand by ranchers in the citrus belts of Orange and Riverside counties for smudging oil. A sudden drop in temperature found a majority of orchardists unprepared, as recent mild winters had led them to carry only minimum quantities of fuel oil in storage. From a previous range of $1.05

(*Continued on page* 43)

ALL grades of fuel oil were steady or higher in most markets the first week of 1937 despite the fact warm weather in many sections and industrial plant shutdowns, due to strikes, tended to cut into demand.

Light oil prices worked higher in much of the large consuming territory of the country. Majority of suppliers along the eastern seaboard advanced their prices 0.25 cent because of their good inventory position. Some of them were not able to catch up on orders despite the warm weather.

Shipments against orders placed before the freight rate reduction, but specifying delivery after the reduction, cut into stocks of fuel oil in the Mid-Western district.

While most traders reported orders for fuel oil generally had not been canceled because of strikes closing industrial plants, they were aware that if strikes were prolonged, consumption would be curtailed in the long run.

* * *

NEW YORK, Jan. 9.—Tank car and barge prices for light fuel oils generally were higher at eastern seaboard terminals the past week, although abnormally warm weather continued to curtail tank wagon demand from home burner owners.

Practically all distributors operating seaboard terminals made advances of 0.25 cent a gallon in open market prices for Nos. 2, 3 and 4 fuel oils, bringing tank car quotations to 4.75 cents at most terminals, including New York harbor, Baltimore, Philadelphia, Boston and Providence. Contract customers were reported to be getting 0.25c off posted tank car prices in many instances.

Warm weather slowed demand considerably, traders said, but most reported there were no excess stocks on hand and that the market still was tight. Many suppliers said they were not interested in open market business at present, since the breathing spell caused by the warm weather was not slackening business enough to give them an oversupply of light fuel oils.

Diesel fuel oil prices, for ships' bunkers, were advanced 20 cents a barrel on Jan. 8 by Standard Oil Co. of New Jersey and other distributors at Boston, Baltimore, New York, Charleston and Philadelphia. New price is $1.85 a barrel. Some distributors at Philadelphia posted a price of $2 a barrel for this business. Prices at Baton Rouge and New Orleans were advanced 20 cents to $1.65 a barrel and 20 cents to $1.95 a barrel at New London, Conn., and Portland, Me.

* * *

TULSA, Jan. 9.—With stocks of heating oil on the downgrade, orders for light fuel oils were increasing in the Mid-Continent. Some orders specified rush shipment.

Apparently northern distributors allowed stocks to dwindle over the holidays and the recent cold snap made necessary the immediate renewal of supplies. Large Mid-Continent refiners have joined other buyers in their search for light fuel oils. These searches revealed only limited supplies available for immediate shipment.

Movement of heavy industrial fuel has been impeded somewhat by strikes at northern industrial plants. While this situation has not resulted yet in the backing up of supplies, such a condition might result if strikes are prolonged. Refiners in the southwest, however, have the railroads to fall back on if industrial demand slumps. Railroads have been increasing their takings of heavy fuel lately and probably would absorb any surplus supplies.

Cracking stocks suffered a setback

(*Continued on page* 41)

FUEL OILS

Prices in Effect Jan. 11, 1937

Following are tank wagon prices of various grades of heating oil at the points shown in various territories. Prices are in cents per gallon.

	No. 1	No. 2	No. 3	No. 4
S. O. NEW JERSEY				
Newark, N. J.	8	6.50	6.50	6.50
Atlantic City, N. J.	8	6.5	6.5	6
Baltimore, Md.	8	6.75	6.75	6.25
Washington, D. C.	8.00	7.00	7.00	7.00

Discounts: At Newark and Atlantic City, purchasers taking 50,000 gals. get discount of 0.5c per gal.

SOCONY-VACUUM OIL CO., INC.
(S. O. New York Division)

New York City	7	6.75	6.75	6.25
Albany, N. Y.	8	6.75	6.75	6.25
Rochester, N. Y.	8.25	7.25	7.25	7.25
Boston, Mass.	7.5	6.50	6.50	6.50
Bangor, Me.	7.5	5.75	5.75	5.75
Manchester, N. H.	8.5	7.00	7.00	7.00
Burlington, Vt.	8.5	7.25	7.25	7.25
New Haven, Conn.	7.50	6.00	6.00	6.00
Providence, R. I.	7.5	6.50	6.50	6.00

Discounts: At New York City, consumers taking 10,000 to 50,000 gals., get 0.25c per gal. discount when minimum amount has been reached; above 50,000 gals., 0.5c.

ATLANTIC REFINING

Philadelphia, Pa.	7.25	6.00	6.00	5.50
Allentown, Pa.	7.75	6.50	6.50	6.50
Wilmington, Del.	8.00	6.25	6.00	5.75
Springfield, Mass.	7.50	6.25	....	6.25
Worcester, Mass.	8.00	6.75	....	6.75
Hartford, Conn.	7.5	6.50	....	6.50

S. O. OHIO

*Ohio Statewide	8.00	7.5	7.00	6.75

Note: S. O. Ohio prices are for hose dumps, bucket dumps are 0.5c per gallon higher.

Except Cleveland Division and City of Toledo. In Cleveland Division (Cuyahoga, Lake and Geauga counties), No. 1 price is same as statewide; Nos. 2, 3 and 4 are 0.5c higher; No. 5 is priced 0.25c lower than No. 4. In Toledo No. 2 is 0.5c lower than statewide, others same.

S. O. INDIANA
Stanolex Fuel and Furnace Oils

	No. 1 Fuel	Stanolex Furnace
Chicago	7.00	7.00
Indianapolis	....	*11.7
Detroit	7.1	7.1
Milwaukee	8	7.3
Minneapolis	7.5	7.5
Sioux City	7.1	7.1
St. Louis	7.5	6.8
Kansas City	6.5	6.5

*Includes state tax of 4c.

Note: Small-lot deliveries of light fuel oils range up to 2c higher than above quotations.

REFINERY TANK CAR MARKETS

Prices in cents per gallon, tank car lots, except where otherwise noted. Inter-refinery and export prices not included. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude.

Gasoline *and* Naphtha

	Jan. 11	Jan. 4	Dec. 28
OKLAHOMA (Prices represent majority of quotations or sales, f.o.b. Oklahoma refineries)			
48-54, 450 e.p. naphtha	*4.625- 4.75	*4.625- 4.75	*4.625- 4.75
U. S. Motor gasoline, by octane numbers:			
62 octane and below	4.75	4.75 - 4.875	4.75 - 4.875
63-67 octane	5.125- 5.375	5.125- 5.375	5.125- 5.375
68-70 octane (regular)	5.75 - 5.875	5.75 - 5.875	5.75 - 5.875
60-62, 400 e.p. gasoline	4.75 - 4.875	4.75 - 4.875	4.75 - 4.875
64-66, 375 e.p. gasoline	*5.00 - 5.25	*5.00 - 5.25	*5.00 - 5.25
68-70, 350-360 e.p. gasoline	*5.125- 5.375	*5.125- 5.375	*5.125- 5.375
*Nominal.			
WESTERN PENNA. (Prices represent majority of quotations or sales)			
Bradford-Warren:			
52-54 naphtha	5.125- 5.25	5.125- 5.25	5.125- 5.25
Motor gasoline:			
U. S. Motor (58-62°)	5.25 - 5.375	5.25 - 5.375	5.25 - 5.375
Minimum 60 octane	6.75 - 6.875	7.00 - 7.125	7.00 - 7.125
Minimum 65 octane	7.00 - 7.125	7.25 - 7.375	7.25 - 7.375
Minimum 70 octane	.....	.....	.....
64-66, 390 e.p. gasoline	5.50 - 5.625	5.50 - 5.625	5.50 - 5.625
68-70, 350-360 e.p. gasoline	5.75 - 5.875	5.75 - 5.875	5.75 - 5.875
Other districts:			
52-54 naphtha	5.125- 5.25	5.125- 5.25	5.125- 5.25
54-56 naphtha	5.25 - 5.375	5.25 - 5.375	5.25 - 5.375
Motor gasoline:			
U. S. Motor (58-62°)	5.25 - 5.375	5.25 - 5.375	5.25 - 5.375
Minimum 60 octane	6.75 - 6.875	7.00 - 7.125	7.00 - 7.125
Minimum 65 octane	7.00 - 7.125	7.25 - 7.375	7.25 - 7.375
Minimum 70 octane	.....	.....	.....
64-66, 390 e.p. gasoline	5.50 - 5.625	5.50 - 5.625	5.50 - 5.625
68-70, 350-360 e.p. gasoline	5.75 - 5.875	5.75 - 5.875	5.75 - 5.875
CALIFORNIA (3c tax to be added to prices if used in state)			
54-58 U. S. Motor, 437 e.p. for in-state shipment	7.50 - 8.50	7.50 - 8.50	7.75 - 8.50
54-58 U. S. Motor, 437 e.p. for outside state shipment	7.75 - 8.50	7.75 - 8.50	7.75 - 8.50
58-61, 375-400 e.p. gasoline, 65 octane and above	8.25 - 9.00	8.25 - 9.00	8.25 - 9.00
†**NORTH TEXAS** (Prices represent majority of quotations or sales, F.o.b. Wichita Falls district for shipment to Texas and New Mexico destinations; Group 3 prices quoted on northern shipments).			
U. S. Motor gasoline, by octane numbers:			
62 octane and below	4.75	4.75	4.75
63-67 octane	5.125- 5.25	5.125- 5.25	5.125- 5.25
68-70 octane (regular)	5.50 - 5.75	5.75	5.75
60-62, 400 e.p. gasoline	4.75 - 4.875	4.75 - 4.875	4.75 - 4.875
64-66, 375 e.p. gasoline	4.875- 5.00	4.875- 5.00	4.875- 5.00
68-70, 350-360 e.p. gasoline	5.00 - 5.125	5.00 - 5.125	5.00 - 5.125
KANSAS (F.o.b. refinery, Kansas destination)			
U. S. Motor gasoline, by octane numbers:			
62 octane and below	5.125- 5.25	5.125- 5.25	5.125- 5.25
63-67 octane	*	*	*
68-70 octane (regular)	6.125- 6.25	6.125- 6.25	6.125- 6.25
60-62, 400 e.p. gasoline	5.125- 5.25	5.125- 5.25	5.125- 5.25
*This price discontinued due to thinness of open market sales.			
†**WEST TEXAS and NEW MEXICO** (Prices represent majority of quotations or sales, F.o.b. W. Texas and N. Mexico refineries for unrestricted shipment unless otherwise noted.)			
U. S. Motor gasoline, by octane numbers:			
62 octane and below	4.75	4.75	4.75
63-67 octane	5.125- 5.25	5.125- 5.25	5.125- 5.25
68-70 octane (regular)	5.75	5.75	5.75
†**EAST TEXAS** (Prices represent majority of quotations or sales, F.o.b. East Texas refinery for unrestricted shipment unless otherwise noted)			
U. S. Motor gasoline, by octane numbers:			
62 octane and below	*4.625	*4.625- 4.75	*4.625- 4.75
60-62, 400 e.p. gasoline	*4.625- 4.75	*4.75	*4.75
*Nominal.			
NORTH LOUISIANA (Prices represent majority of quotations or sales, f.o.b. Louisiana refineries, for shipment within Louisiana and into Arkansas)			
U. S. Motor gasoline:			
62 octane and below	5.50	5.50	5.50
63-67 octane	6.25	6.25	6.25
68-70 octane (regular)	6.50	6.50	6.50
†Refiners report they generally receive from 0.25c to 0.5c per gallon more for gasoline and kerosine for local or differential territory shipment.			
	Jan. 11	Jan. 4	Dec. 28
ARKANSAS (Prices represent majority of quotations or sales, f.o.b. Arkansas refineries, for shipment within Arkansas and into Louisiana)			
U. S. Motor Gasoline:			
62 octane and below	5.50	5.50	5.50
63-67 octane	6.25	6.25	6.25
68-70 octane (regular)	6.50	6.50	6.50
OHIO (Quotations of S. O. Ohio. Delivered any point in Ohio)			
U. S. Motor gasoline	8.50	8.50	8.50
Above 65 octane no.	8.75	8.75	8.75

Natural Gasoline

(Prices shown f.o.b. Group 3 and Breckenridge represent majority of quotations or sales to blenders on freight basis shown below. Shipments, however, may originate in other Mid-Continent manufacturing districts, such as Panhandle Texas, Southwest Texas or Kansas.)

F.O.B. GROUP 3			
Grade 26-70	3.00	3.50	3.75 - 4.00
F.O.B. BRECKENRIDGE			
Grade 26-70	2.75	3.25	3.75
CALIFORNIA (F.o.b. plants in Los Angeles basin)			
75-85, 375-390 e.p. for blending	7.25 - 7.50	7.25 - 7.50	7.25 - 7.50

Kerosine

WESTERN PENNA. (Prices represent majority of quotations or sales)			
Bradford-Warren:			
45 w.w. kerosine	5.00 - 5.125	4.875- 5.00	4.875- 5.00
46 w.w. kerosine	5.125- 5.25	5.00 - 5.125	5.00 - 5.125
47 w.w. kerosine	5.25 - 5.375	5.125- 5.25	5.125- 5.25
Other districts:			
45 w.w. kerosine	5.00 - 5.125	4.875- 5.00	4.875- 5.00
46 w.w. kerosine	5.125- 5.25	5.00 - 5.125	5.00 - 5.125
47 w.w. kerosine	5.25 - 5.375	5.125- 5.25	5.125- 5.25
OKLAHOMA (Prices represent majority of quotations or sales, f.o.b. Oklahoma refineries)			
41-43 w.w. kerosine	3.75 - 4.00	3.75 - 3.875	3.75 - 3.875
42-44 w.w. kerosine	3.875- 4.125	3.875- 4.00	3.875- 4.00
KANSAS (F.o.b. refinery Kansas destination)			
41-43 w.w. kerosine	3.875- 4.00	3.875- 4.00	3.875- 4.00
42-44 w.w. kerosine	4.00 - 4.125	4.00 - 4.125	4.00 - 4.125
†**NORTH TEXAS** (Prices represent majority of quotations or sales, f.o.b. Wichita Falls district for shipment to Texas and New Mexico destinations; Group 3 prices quoted on northern shipments)			
41-43 w.w. kerosine	3.875- 4.00	3.75 - 3.875	3.75 - 3.875
†**EAST TEXAS** (Prices represent majority of quotations or sales, f.o.b. East Texas refinery for unrestricted shipment unless otherwise noted)			
41-43 w.w. kerosine	*4.00	*4.00	*4.00
*Nominal.			
NORTH LOUISIANA (Prices represent majority of quotations or sales, f.o.b Louisiana refineries, for shipment within Louisiana and into Arkansas)			
41-43 w.w. kerosine	4.125- 4.25	4.00 - 4.25	4.00 - 4.25
ARKANSAS (Prices represent majority of quotations or sales, f.o.b. Arkansas refineries, for shipment within Arkansas and into Louisiana)			
41-43 w.w. kerosine	*5.00	*4.25	*4.25
*Nominal.			
CALIFORNIA (F.o.b. California refineries)			
38-40 w.w. kerosine	4.00 - 5.00	4.00 - 5.00	4.00 - 5.00

Gas and Fuel Oils

WESTERN PENNA. (Prices represent majority of quotations or sales)			
Bradford-Warren:			
36-40 fuel oil	4.50 - 4.625	4.50 - 4.625	4.50 - 4.625
Other districts: (Excluding Pittsburgh District Prices)			
36-40 fuel oil	4.50 - 4.625	4.50 - 4.625	4.50 - 4.625
OKLAHOMA (Prices represent majority of quotations or sales, f.o.b. Oklahoma refineries)			
No. 1 white fuel oil	3.75 - 3.875	3.625- 3.75	3.625- 3.75
No. 1 straw fuel oil	3.625- 3.75	3.50 - 3.625	3.50 - 3.625
No. 2 straw fuel oil	3.50 - 3.625	3.50	3.50
No. 2 dark fuel oil	3.375- 3.50	3.375- 3.50	3.375- 3.50
U. G. I. gas oil	2.75 - 3.00	2.75 - 3.00	2.75 - 3.00

(*Continued on next page*)

REFINERY TANK CAR MARKETS

Prices in cents per gallon, tank car lots, except where otherwise noted. Inter-refinery and export prices not included. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude.

Oklahoma (cont'd)

	Jan. 11	Jan. 4	Dec. 28
Fuel Oils: (Prices per barrel of 42 U. S. gallons)			
28-30 zero	3.375– 3.50	3.375	3.25 – 3.375
28-30	$1.125–$1.175	$1.125–$1.175	$1.125–$1.175
24-26	*$0.775–$0.825	*$0.775–$0.825	*$0.775–$0.825
18-22	*$0.75 –$0.80	*$0.75 –$0.80	*$0.75 –$0.80
14-16	$0.675–$0.70	$0.675–$0.70	$0.675–$0.70

KANSAS (F.o.b. refinery, Kansas destination)

No. 1 p.w. fuel oil	3.875	3.875	3.75 – 3.875
18-22 fuel oil (per bbl.)	$0.80 –$0.85	$0.80 –$0.85	$0.75 –$0.80
10-14 fuel oil (per bbl.)	$0.725–$0.75	$0.725–$0.75	$0.725–$0.75

NORTH TEXAS (Prices represent majority of quotations or sales, f.o.b. Wichita Falls district for shipment to Texas and New Mexico; Group 3 prices quoted on northern shipments).

No. 1 straw, fuel oil	*3.625	*3.50 – 3.625	*3.50 – 3.625
No. 1 white, fuel oil	*3.75	*3.625	*3.625
U.G.I. gas oil	2.75	2.75	2.75
No. 2 fuel oil	*3.50 – 3.625	*3.50	*3.50
24-26 fuel oil (per bbl.)	$0.725–$0.75	$0.725–$0.75	$0.725–$0.75
18-22 fuel oil (per bbl.)	$0.675–$0.70	$0.675–$0.70	$0.675–$0.70

*Nominal.

WEST TEXAS (Prices represent majority of quotations or sales, f.o.b West Texas refineries for unrestricted shipment unless otherwise noted).

No. 2 fuel oil	*3.50	*3.375	*3.375
18-22 fuel oil (per bbl.)	$0.675–$0.70	$0.675–$0.70	$0.675–$0.70

*Nominal.

EAST TEXAS (Prices represent majority of quotations or sales, f.o.b. East Texas refineries for unrestricted shipment unless otherwise noted)

No. 1 white, fuel oil	*3.75 – 3.875	*3.75 – 3.875	*3.625
U.G.I. gas oil	*2.625– 2.75	*2.625– 2.75	*2.625– 2.75
No. 2 fuel oil	*3.50 – 3.625	*3.50 – 3.625	*3.50
24-26 fuel oil (per bbl.)	*$0.675–$0.70	*$0.675–$0.70	*$0.675–$0.70
20-24 fuel oil (per bbl.)	*$0.65 –$0.675	*$0.65 –$0.675	*$0.65 –$0.675

*Nominal

NORTH LOUISIANA (Prices represent majority of quotations or sales f.o.b. Louisiana refineries, for shipment within Louisiana and into Arkansas)

No. 2 fuel oil	3.375– 3.50	3.375– 3.50	3.375– 3.50
U.G.I. gas oil	2.625	2.625	2.625
20-24 fuel oil (per bbl.)	$1.05 –$1.10	$1.05 –$1.10	$1.05 –$1.10
16-20 fuel oil (per bbl.)	$0.95 –$1.00	$0.95 –$1.00	$0.95 –$1.00
10-14 fuel oil (per bbl.)	$0.70 –$0.75	$0.70 –$0.75	$0.70 –$0.75

ARKANSAS (Prices represent majority of quotations or sales, f.o.b. Arkansas refineries, for shipment within Arkansas and into Louisiana)

No. 2 fuel oil	*3.75	*3.75	*3.75
28-30 gas oil, zero	*3.50	*3.50	*3.50
20-24 fuel oil (per bbl.)	†$0.825–$0.875	†$0.825–$0.875	†$0.825–$0.875
16-20 fuel oil (per bbl.)	†$0.725–$0.775	†$0.725–$0.775	†$0.725–$0.775
10-14 fuel oil (per bbl.)	$0.60 –$0.65	$0.60 –$0.65	$0.60 –$0.65

*Only one refiner quoting.

†Nominal.

CALIFORNIA

San Joaquin Valley, per bbl.:			
Grade C fuel oil	$0.65 –$0.80	$0.60 –$0.75	$0.60 –$0.75
Diesel fuel oil	$0.95 –$1.47	$0.90 –$1.47	$0.90 –$1.47
Stove distillate	$1.30 –$1.89	$1.25 –$1.89	$1.25 –$1.89
Los Angeles, per bbl.:			
Grade C fuel oil	$0.70 –$0.95	$0.65 –$0.95	$0.65 –$0.95
Diesel fuel	$1.00 –$1.47	$0.95 –$1.47	$0.95 –$1.47
Stove distillate	$1.30 –$1.89	$1.25 –$1.89	$1.25 –$1.89
San Francisco, per bbl.:			
Grade C fuel oil	$1.00	$1.00	$1.00
Diesel fuel	$1.68	$1.68	$1.68
Stove distillate	$2.10	$2.10	$2.10

Neutral Oils

WESTERN PENNA. (Prices represent majority of quotations or sales)

	Viscous Neutrals (*Viscosity at 70° F.*)		
200 Vis. (180 at 100°) No. 3 color, 420-425 flash:			
0 pour test	25.50 –26.00	25.00 –25.50	25.00 –25.50
10 pour test	24.50 –25.00	24.00 –24.50	24.00 –24.50
15 pour test	24.00 –24.50	23.50 –24.00	23.50 –24.00
25 pour test	23.00 –23.50	22.50 –23.00	22.50 –23.00
180 Vis. (165 at 100) No. 3 color, 410-415 flash:			
25 pour test	22.00 –22.50	21.50 –22.00	21.50 –22.00
150 Vis. (143 at 100) No. 3 color, 400-405 flash:			
0 pour test	22.00 –22.50	21.50 –22.00	21.50 –22.00
10 pour test	21.00 –21.50	20.50 –21.00	20.50 –21.00
15 pour test	20.50 –21.00	20.00 –20.50	20.00 –20.50
25 pour test	19.50 –20.00	19.00 –19.50	19.00 –19.50

SOUTH TEXAS (Quotations of majority of sellers for tank car lots, f.o.b South Texas refineries, for domestic shipment)

Vis. Color Pale Oils:	(*Viscosity at 100° F.; pour test 0*)		
100 No. 1½-2½	5.00 – 5.50	5.00 – 5.50	5.00
200 No. 2-3	7.00 – 7.50	7.00 – 7.50	7.00
300 No. 2-3	7.50 – 8.00	7.50 – 8.00	7.50
500 No. 2½-3½	8.50 – 9.00	8.50 – 9.00	8.50
750 No. 3-4	9.00 – 9.50	9.00 – 9.50	9.00
1200 No. 3-4	9.50 –10.00	9.50 –10.00	9.50
2000 No. 4	10.00 –10.50	10.00 –10.50	10.00

	Jan. 11	Jan. 4	Dec. 28
Red Oils:			
200 No. 5-6	7.00 – 7.50	7.00 – 7.50	7.00
300 No. 5-6	7.50 – 8.00	7.50 – 8.00	7.50
500 No. 5-6	8.50 – 9.00	8.50 – 9.00	8.50
750 No. 5-6	9.00 – 9.50	9.00 – 9.50	9.00
1200 No. 5-6	9.50 –10.00	9.50 –10.00	9.50
2000 No. 5-6	10.00 –10.50	10.00 –10.50	10.00

Note: South Texas red oil prices shown above cover oils with green cast; blue cast red oils are slightly lower in some cases.

MID-CONTINENT (Viscosity at 100° F.; F.o.b. Tulsa basis. Prices represent majority of quotations or sales)

	(0 to 10 Pour Point)		
Pale Oils Vis. Color			
60-85—No. 2	5.25	5.25	5.25
86-110—No. 2	5.75	5.75	5.75
150—No. 3	8.50	8.50	8.50
180—No. 3	9.50	9.50	9.50
200—No. 3	10.00	10.00	10.00
250—No. 3	11.00	11.00	11.00
280—No. 3	12.00	12.00	12.00
300—No. 3	12.50	12.50	12.50
Red Oils:			
180—No. 5	8.50	8.50	8.50
200—No. 5	9.00	9.00	9.00
250—No. 5	10.00	10.00	10.00
280—No. 5	11.00	11.00	11.00
300—No. 5	11.25	11.25	11.25

Note: Viscous and non-viscous oils, 15 to 25 pour point are generally quoted 0.5c under 0 to 10 pour point oils. Viscous oils (150-300 vis.), No. 4 color, are generally quoted 0.5c above No. 5 color oils.

CHICAGO (F.o.b. Chicago District refineries) (Vis. at 100° F

Pale Oils *15 to 30 pour point: Vis. Color			
60-85—No. 2	6.50	6.50	6.50
86-110—No. 2	7.00	7.00	7.00
150—No. 3	9.50	9.50	9.50
180—No. 3	10.00	10.00	10.00
200—No. 3	10.50	10.50	10.50
250—No. 3	11.50	11.50	11.50
Red Oils *15 to 30 Pour Point:			
180—No. 5	9.00	9.00	9.00
200—No. 5	9.50	9.50	9.50
250—No. 5	10.50	10.50	10.50
280—No. 5	11.50	11.50	11.50
300—No. 5	11.75	11.75	11.75

*Oils with 0-10 pour point are quoted at 0.5c higher. To obtain prices delivered in Chicago add 0.25c per gal.

CALIFORNIA (F.o.b. California refineries; Viscosity at 100° F.)
Neutral oils not now being quoted.

Cylinder Stocks

MID-CONTINENT (F.o.b. Tulsa basis. Prices represent majority of quotations or sales)

Bright Stocks:			
190-200 Vis. at 210° D	20.50	20.00	20.00
150-160 Vis. at 210° D:			
0 to 10 pour test	17.50	17.00	17.00
10 to 25 pour test	17.00	16.50	16.50
25 to 40 pour test	16.50	16.00	16.00
150-160 Vis. at 210° E	16.50	16.00	16.00
120 Vis. at 210° D:			
0 to 10 pour test	16.50	16.00	16.00
10 to 25 pour test	16.00	15.50	15.50
25 to 40 pour test	15.50	15.00	15.00
600 Stm. Rfd. Dark Green	5.00 – 5.75	5.00 – 5.75	5.00 – 5.75
600 Stm. Rfd. Olive Green	6.50 – 7.50	6.50 – 7.50	6.50 – 7.50
631 Steam Refined	*13.00	*13.00	*13.00
Black Oil	3.25 – 3.375	3.25 – 3.375	3.25 – 3.375

*Only one refiner quoting.

CHICAGO (F.o.b. Chicago district refineries) (Viscosity at 210°)

Unfiltered Steam Refined:			
140	9.00	9.00	9.00
160	10.00	10.00	10.00
200	11.00	11.00	11.00
Bright stocks, 160 vis. at 210 No. 8 color:			
0 to 10 pour point	18.75	18.75	18.75
15 to 25 pour point	18.25	18.25	18.25
30 to 40 pour point	17.75	17.75	17.75
E filtered Cyl. Stock	14.50	14.50	14.50

To obtain prices delivered in Chicago, add 0.25c per gal.

WESTERN PENNA. (A.S.T.M. tests; prices represent majority of quotations or sales, to car unloaders)

600 stm. rfd. filterable	13.50 –14.00	13.00 –13.50	13.00 –13.50
650 steam refined	15.00 –15.50	14.50 –15.00	14.50 –15.00

(Continued on next page)

REFINERY TANK CAR MARKETS

Prices in cents per gallon, tank car lots, except where otherwise noted. Inter-refinery and export prices not included. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude.

Cylinder Stocks (cont'd)

Western Pennsylvania (cont'd)

	Jan. 11	Jan. 4	Dec. 28
600 flash	16.00 –16.50	15.50 –16.00	15.50 –16.00
630 flash	17.00 –17.50	17.00 –17.50	17.00 –17.50
600 Warren E	16.00 –16.50	16.00 –16.50	16.00 –16.50
Bright stock, 145-155 vis. at 210°, 540-550 flash, No. 8 color:			
10 pour test	24.00 –24.50	23.50 –24.00	23.50 –24.00
15 pour test	23.00 –23.50	22.50 –23.00	22.50 –23.00
20 pour test	22.00 –22.50	21.50 –22.00	21.50 –22.00
25 pour test	21.00 –21.50	20.50 –21.00	20.50 –21.00

Petrolatums

WESTERN PENNA. (Per pound, in barrels, carload lots, f.o.b. Penna. refineries. In tank cars, 0.5c per pound less. Quotations by majority of refiners making petrolatums)

Snow White	6.625	6.625	6.625
Lily White	5.625	5.625	5.625
Cream White	4.625	4.625	4.625
Light Amber	2.75	2.75	2.75
Amber	2.50	2.50	2.50
Red	2.00 – 2.125	2.00 – 2.125	2.00 – 2.125

Wax

	Jan. 11	Jan. 4	Dec. 28
WESTERN PENNA. (Prices represent majority of quotations or sales, per pound, f.o.b. New York)			
122-124 wh. crude scale, A.m.p.	2.45 – 2.50	2.45 – 2.50	2.45 – 2.50
124-126 wh. crude scale, A.m.p.	2.50 – 2.55	2.50 – 2.55	2.50 – 2.55
OKLAHOMA (Prices represent majority of quotations or sales, per pound in barrels; in a few instances, per pound in burlap bags; f.o.b. Oklahoma refineries)			
124-126 wh. crude scale, A.m.p.	2.625– 2.75	2.625– 2.75	2.625– 2.75
CHICAGO (Quotations of majority of sellers f.o.b. Chicago district refineries, in bags, carload lots. Melting points are E.M.P. (A.S.T.M.) methods; add 3° F. to convert into A.m.p.)			
Fully refined:			
122-124	4.65 – 4.75	4.65 – 4.75	4.65 – 4.75
125-127	4.90 – 5.00	4.90 – 5.00	4.90 – 5.00
127-129	5.05 – 5.15	5.05 – 5.15	5.05 – 5.15
130-132	*5.45 – 5.55	*5.45 – 5.55	*5.45 – 5.55
132-134	*5.70 – 5.80	*5.70 – 5.80	*5.70 – 5.80
135-137	*6.45 – 6.55	*6.45 – 6.55	*6.45 – 6.55

*Same prices quoted in bags or slabs loose.

MID-WESTERN TANK CAR MARKETS

Prices in cents per gallon, except where otherwise noted, in tank car lots, representing majority of quotations or sales made by Chicago sellers, from legally produced crude to jobbers on Group 3 (Oklahoma) freight basis, although shipments may originate in other South-western or Mid-western refining districts. Prices do not include state or federal taxes.

Gasoline

U.S. Motor gasoline:	Jan. 11	Jan. 4	Dec. 28
62 octane and below	4.50 – 4.75	4.625– 4.875	4.625– 4.875
63-67 octane	5.00 – 5.25	5.00 – 5.25	5.00 – 5.25
68-70 octane (regular)	5.50 – 5.75	5.50 – 5.875	5.50 – 5.875
60-62, 400 e.p.	4.50 – 4.75	4.625– 4.875	4.625– 4.875
64-66, 375 e.p.	5.00 – 5.125	5.00 – 5.125	5.00 – 5.125
68-70, 350-360 e.p.	5.125– 5.25	5.125– 5.25	5.125– 5.25

Kerosine

41-43 w.w.	3.75 – 3.875	3.625– 3.75	3.625– 3.75
42-44 w.w.	3.875– 4.00	3.75 – 3.875	3.75 – 3.875

Fuel and Gas Oils

Domestic:			
No. 1 prime white	3.75	3.625– 3.75	3.625– 3.75
No. 1 straw	3.50 – 3.625	3.50 – 3.625	3.50 – 3.625
No. 2 straw	3.375– 3.50	3.375– 3.50	3.375– 3.50
No. 2 dark	3.375– 3.50	3.25 – 3.375	3.25 – 3.375
No. 3	3.375	3.25 – 3.375	3.25 – 3.375
No. 4 (per bbl.)	$1.00 –$1.05	$0.95 –$1.00	$0.95 –$1.00
No. 5 (per bbl.)	$0.75 –$0.80	$0.75 –$0.80	$0.75 –$0.80
Industrial:			
No. 4 (per bbl.)	$0.85 –$0.90	$0.85 –$0.90	$0.85 –$0.90
No. 5 (per bbl.)	$0.70 –$0.725	$0.65 –$0.70	$0.65 –$0.70
No. 6 (per bbl.)	$0.675–$0.70	$0.60 –$0.65	$0.60 –$0.65
U.G.I. gas oil	2.75 – 2.875	2.625– 2.875	2.625– 2.875

Naphtha and Solvent

(Tank car prices quoted f.o.b. Group 3 by majority of Chicago sellers)

Stoddard solvent	6.875	6.875	6.875
V. M. & P. naphtha	7.375	7.375	7.375
Cleaners' naphtha	7.375	7.375	7.375
Mineral spirits	6.375	6.375	6.375
Rubber solvent	7.375	7.375	7.375
Lacquer diluent	8.375	8.375	8.375

DAILY GASOLINE PRICES

Daily range of gasoline prices (cents per gallon) in tank cars, as reported in PLATT'S OILGRAM, (Week Ended Jan. 8, 1937)

	Jan. 4	Jan. 5	Jan. 6	Jan. 7	Jan. 8
U. S. Motor, 62 octane and below:					
East Texas	†4.625– 4.75	†4.625	†4.625	†4.625	†4.625
*North Texas	4.75	4.75	4.75	4.75	4.75
West Texas	4.75	4.75	4.75	4.75	4.75
Oklahoma	4.75 – 4.875	4.75 – 4.875	4.75	4.75	4.75
Mid-Western (Group 3 basis)	4.625– 4.875	4.625– 4.75	4.625– 4.75	4.50 – 4.75	4.50 – 4.75
U. S. Motor, 63–67 octane:					
*North Texas	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25
West Texas	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25
Oklahoma	5.125– 5.375	5.125– 5.375	5.125– 5.375	5.125– 5.375	5.125– 5.375
Mid-Western (Group 3 basis)	5.00 – 5.25	5.00 – 5.25	5.00 – 5.25	5.00 – 5.25	5.00 – 5.25
U. S. Motor, 68–70 octane (regular)					
*North Texas	5.75	5.75	5.50 – 5.75	5.50 – 5.75	5.50 – 5.75
West Texas	5.75	5.75	5.75	5.75	5.75
Oklahoma	5.75 – 5.875	5.75 – 5.875	5.75 – 5.875	5.75 – 5.875	5.75 – 5.875
Mid-Western (Group 3 basis)	5.50 – 5.875	5.50 – 5.75	5.50 – 5.75	5.50 – 5.75	5.50 – 5.75
Motor Gasoline, 60-64 octane					
New York harbor	†6.50	†6.50	†6.50	†6.50	†6.50
Philadelphia district	†6.50	†6.50	†6.50	†6.50	†6.50
Baltimore district	†6.50	†6.50	†6.50	†6.50	†6.50
Motor Gasoline, 65 octane & above					
New York harbor	†6.75	†6.75	†6.75	†6.75	†6.75
Philadelphia district	†6.75	†6.75	†6.75	†6.75	†6.75
Baltimore district	†6.75	†6.75	†6.75	†6.75	†6.75
U. S. Motor Gasoline, 58–62°					
Bradford-Warren (Western Penna.)	5.25 – 5.375	5.25 – 5.375	5.25 – 5.375	5.25 – 5.375	5.25 – 5.375
Other districts (Western Penna.)	5.25 – 5.375	5.25 – 5.375	5.25 – 5.375	5.25 – 5.375	5.25 – 5.375
Motor Gasoline, Minimum 60 octane					
Bradford-Warren (Western Penna.)	7.00 – 7.125	7.00 – 7.125	7.00 – 7.125	7.00 – 7.125	7.00 – 7.125
Other districts (Western Penna.)	7.00 – 7.125	7.00 – 7.125	7.00 – 7.125	7.00 – 7.125	7.00 – 7.125
Motor Gasoline, Minimum 65 octane					
Bradford-Warren (Western Penna.)	7.25 – 7.375	7.25 – 7.375	7.25 – 7.375	7.25 – 7.375	7.25 – 7.375
Other districts (Western Penna.)	7.25 – 7.375	7.25 – 7.375	7.25 – 7.375	7.25 – 7.375	7.25 – 7.375

*For shipment to Texas and New Mexico destinations; Group 3 prices are quoted on northern shipments.
†Nominal.

TANK WAGON, SERVICE STATION MARKETS

Tax column includes 1c federal tax, state gasoline tax, also city and county taxes as indicated in footnotes, and inspection fees, as shown in general footnote. These prices in effect Jan. 11, 1937 as posted by principal marketing companies at their headquarters offices, but subject to later corrections

S. O. New Jersey

ESSOLENE

	Consumer Tank Car	Dealer T.W.	Taxes	Posted S.S.	Kerosine T.W.
Atlantic City, N. J.	7	8.5	4	*	8
Newark, N. J.	7	8.5	4	*	8
Annapolis, Md.	8.1	9.6	5	*	10
Baltimore, Md.	7.5	9	5	*	9
Cumberland, Md.	9.1	11.6	5	*	10
Washington, D. C.	7.5	9	3	15.5	9
Danville, Va.	8.7	11.2	6	*	12.9
Norfolk, Va.	7.5	10	6	*	11.5
Petersburg, Va.	7.8	10.3	6	*	11.7
Richmond, Va.	7.8	10.3	6	*	11.7
Roanoke, Va.	9	11.5	6	*	12.9
Charleston, W. Va.	8.3	10.8	5	*	12.6
Parkersburg, W. Va.	7.6	10.1	5	*	11.2
Wheeling, W. Va.	8.5	10	5	*	12.2
Charlotte, N. C.	8.9	11.4	7	*	12.6
Hickory, N. C.	9.4	11.9	7	*	13
Mt. Airy, N. C.	9.2	11.7	7	*	12.8
Raleigh, N. C.	8.5	11	7	*	12.1
Salisbury, N. C.	9	11.5	7	*	12.7
Charleston, S. C.	7.5	10	7	*	11.1
Columbia, S. C.	8.5	11	7	*	12.1
Spartanburg, S. C.	9.2	11.7	7	*	12.9

*S. O. New Jersey transferred stations to dealers; no prices available.

Price basis to undivided dealers: Dealer t.w. price less 0.5c per gal.

Price basis to commercial consumers: Effective Nov. 2, 1936, in New Jersey, Maryland, District of Columbia, and small portions of Virginia and West Virginia, to contract and non-contract accounts, taking following deliveries at one time, by hose connection, prices based on consumer tank car price in effect at time and place of delivery: 500 gals. or more, 0.5c over t.c price; less than 500 gals., 0.75c over; accounts not taking deliveries by hose connection, 1c over t.c.

Effective Feb. 11, 1935, in North and South Carolina, and greater portions of Virginia and West Virginia, the following differentials apply above posted tank car price, on yearly purchases: up to 35,999 gals., 2.5c over t.c.; 36,000 to 119,999 gals., 2c; 120,000 to 239,999 gals., 1.5c; 240,000 to 479,999 gals., 1c; and over 480,000 gals., 0.5c. Non-contract accounts, 2.5c over posted t.c. price.

Kerosine Discount: 1c off t.w. price for 25 gals. or more, under contract thru territory (Baltimore City contract not necessary) except no discount in state of New Jersey.

Socony-Vacuum Oil Co., Inc.

(S. O. New York Division)

SOCONY MOBILGAS

	Consumer Tank Car	"Split" Dealer T.W.	Taxes	Total "Split" Dealer T.W.	Kerosine T.W.
Metropolitan N. Y. City: Boroughs of Manhattan, Bronx and Brooklyn (Kings and Queens)	7.5	9	*4	13	7.5
Borough of Richmond (Staten Is.)	7.5	9.25	*4	13.25	7.5
Albany, N. Y.	7.5	9	4	13	8
Binghamton, N. Y.	8.75	10.3	4	14.3	8.75
Buffalo, N. Y.	8.17	9.8	4	13.8	8.25
Jamestown, N. Y.	7.78	10.3	4	14.3	8.25
Plattsburg, N. Y.	7.9	9.9	4	13.9	9
Rochester, N. Y.	8.24	9.8	4	13.8	8.25
Syracuse, N. Y.	8.2	9.8	4	13.8	9
Danbury, Conn.	7.8	9.3	4	13.3	8.25
Hartford, Conn.	7.6	9.1	4	13.1	7.5
New Haven, Conn.	7.5	9	4	13	7.5
Bangor, Me.	8.1	10.3	5	15.3	7.5
Portland, Me.	7.6	9.8	5	14.8	8.25
Boston, Mass.	7.3	8.8	4	12.8	7.5
Concord, N. H.	8.2	10.8	5	15.8	9
Lancaster, N. H.	9.1	11.8	5	16.8	10
Manchester, N. H.	8	10.3	5	15.3	8.5
Providence, R. I.	7.3	8.8	3	11.8	7.5
Burlington, Vt.	7.9	9.9	5	14.9	8.5
Rutland, Vt.	8.2	10.2	5	15.2	8

*Plus 2% city sales tax computed at time of each sale.

Note: Socony-Vacuum has transferred all service stations to dealers; no prices available.

Price basis to undivided dealers: 0.5c less than "split" dealer t.w.

Price basis to commercial consumers: Effective about Nov. 15, 1936 in New York and New England, for tank wagon delivery: monthly purchases of 25,000 gals. or over, pay consumer tank car price at point of delivery, plus 0.5c gal.; monthly purchases of 5,000 to 25,000 gals., pay undivided dealer tank wagon price at point of delivery; monthly purchases of less than 5,000 gals., pay divided dealer tank wagon price at point of delivery. Private consumers pay undivided dealer tank wagon price at point of delivery, plus 2c gal.

Atlantic Refining

ATLANTIC WHITE FLASH GASOLINE

	Commercial Tank Car	All Tax	Total Dealer T.W.	S.S.	Kerosine T.W.
Philadelphia, Pa.	7.5	5	14	17.5	10
Pittsburgh	8	5	15	18.5	10.5
Allentown	7.75	5	14	**	10.5
Erie	7.5	5	14	**	10.5
Scranton	7.75	5	14	**	10.5
Altoona	8	5	15	**	10.5
Harrisburg	7.75	5	14	**	10.5
Williamsport	8.0	5	15	**	10.5
Dover, Del.	....	5	14	**	10.5
Wilmington	....	5	13	**	10.5
Boston, Mass.	....	4	12.8	**	7.5
Springfield, Mass.	....	4	13.3	**	7.5
Worcester, Mass.	....	4	13.8	**	8
Fall River, Mass.	....	4	12.8	**	7.5
Hartford, Conn.	....	4	13.1	**	7.5
New Haven, Conn.	....	4	13	**	8
Providence, R. I.	....	3	11.8	**	7.5
Atlantic City, N. J.	....	4	12.5	**	8
Camden, N. J.	....	4	12.5	**	8
Trenton, N. J.	....	4	12.5	**	8
Annapolis, Md.	....	5	14.6	**	9.5
Baltimore, Md.	....	5	14	**	8
Hagerstown, Md.	....	5	15	**	10
Richmond, Va.	....	6	16.3	**	11.7
Wilmington, N. C.	....	7	17.1	**	11.3
Brunswick, Ga.	....	7	17.5	**	*12.5
Jacksonville, Fla.	....	8	17.5	**	11.5

*Georgia has kerosine tax of 1c per gal., not included in above price.

**Atlantic Refining transferred stations to dealers; no prices available.

Price basis to undivided dealers: Dealer t.w less 0.5c per gal.

Price basis to commercial consumer: Effective Nov. 5, 1936, on yearly gasoline purchases to contract accounts taking t.w. deliveries, based on posted tank car prices plus following amounts: 2,500 to 100,000 gals., 1c over t.c.; 100,000 gals., and over, 0.5c. Non-contract accounts taking 50 gals. or over at one time pay dealer t.w. price.

Discount on kerosine: in Pennsylvania and Delaware, 2c per gal. off t.w. price on t.w. deliveries of 25 gals. or more at one time.

S. O. Ohio

SOHIO X-70 GASOLINE

	Consumer T.W.	All Tax	Total Consumer T.W.	Kerosine T.W.
Ohio Statewide	12.5	5	17.5 ‡	*13.5
Counties below statewide gasoline schedule: Ashtabula, Butler, Champaign, Clarke, Clermont, Clinton, Columbiana, Cuyahoga, Darke, Defiance, Delaware, Fayette, Fairfield, Fulton, Geauga, Greene, Hamilton, Highland, Jefferson, Knox, Lake, Licking, Lorain, Lucas, Madison, Mahoning, Marion, Medina, Miami, Montgomery, Morrow, Muskingum, Pickaway, Portage, Preble, Ross, Stark, Summit, Trumbull, Warren and Williams:	11.5	5	16.5	....
Paulding	11	5	16	....

RENOWN

(Third-Grade Gasoline)

Ohio Statewide	12	5	17 ‡	....
Counties below statewide gasoline schedule: Butler, Clermont, Darke, Hamilton, Greene, Miami, Montgomery, Preble, Summit and Warren:	11.5	5	16.5	....
Ashtabula, Champaign, Clarke, Clinton, Columbiana, Cuyahoga, Defiance, Delaware, Fairfield, Fayette, Franklin, Fulton, Geauga, Highland, Jefferson, Knox, Lake, Licking, Lorain, Lucas, Madison, Mahoning, Marion, Medina, Morrow, Muskingum, Pickaway, Portage, Ross, Stark, Trumbull and Williams:	11	5	16	....
Paulding	9	5	14	....
Counties above statewide schedule: Hocking	12.5	5	17.5	....

KEROSINE PRICES

(Off Statewide Level)

Kerosine prices are off statewide level in the following counties:

Gallia *13

S. O. Ohio—Cont'd

Allen, Ashtabula, Auglaize, Champaign, Columbiana, Darke, Fulton, Geauga, Hancock, Hardin, Henry, Logan, Mahoning, Mercer, Portage, Preble, Putnam, Shelby, Summit, Trumbull, Union, Van Wert and Wyandotte *12.5

Defiance and Paulding *12

Statewide Prices to Resellers & Agents

(These gasoline prices are based on low of Group 3, 68-70 octane, gasoline tank car market as published in Platt's Oilgram, to the nearest 0 5c).

Including tax	†Undivided Accounts	Divided Accounts	**Authorized Agents
Sohio X-70	16	16.5	16.5
Renown (3rd grade)	15.5	16	16

‡Effective Sept. 16, 1936, S. O. Ohio began leasing service stations to dealers. No statewide s.s. price available although the company does post s.s. prices locally at points where it still operates stations.

Sales tax: Ohio's 3% sales tax, effective Jan. 27, 1935, is added "where assessable, to regular posted prices," S. O. Ohio says.

*Kerosine prices include 1c state tax.

†Excluding authorized agents.

**Excluding 0.5c rental.

Discounts to commercial contract tank wagon consumers only: on all motor gasolines, thru Ohio, effective Sept. 16, 1936, except counties mentioned hereafter, off posted t.w. price, on deliveries per month: 1,000 to 9,999 gals., 1.5c per gal.; 10,000 gals. and over, 2.5c. Under 1,000 gals., posted t.w. price. Single deliveries of less than 25 gals., on X-70 and Ethyl, 2c above consumers, t.w. price; Renown, 1c above Q. D. A. is off statewide schedule in the following counties: Allen, Ashtabula, Auglaize, Clinton, Columbiana, Darke, Defiance, Delaware, Franklin, Fulton, Hamilton, Hancock, Hardin, Henry, Highland, Jefferson, Knox, Logan, Lucas, Mahoning, Marion, Medina, Mercer, Pickaway, Putnam, Ross, Shelby, Trumbull, Union, Van Wert, Washington and Williams: for this information, write National Petroleum News.

Price basis on kerosine to dealers and commercial consumers, posted at 3c per gal. below consumer t.w. price, any quantity

S. O. Kentucky

CROWN GASOLINE

(Regular Grade)

	Consumer T.W.	All Tax	Total Consumer T.W.	Net Dealer	Kerosine T.W.
Covington, Ky.	12.5	6	18.5	15.5	11
Lexington, Ky.	13	6	19	16	11
Louisville, Ky.	13	6	19	16	10
Paducah, Ky.	13	6	19	16	10
Jackson, Miss.	14	7	21	18	13
Vicksburg, Miss.	13.5	7	20.5	17.5	13
Birmingham, Ala.	14	*8	22	19	13
Mobile, Ala.	11	*9	20	17	12
Montgomery, Ala.	14	*9	23	20	14
Atlanta, Ga.	14.5	7	21.5	18.5	14.5
Augusta, Ga.	13.5	7	20.5	17.5	14
Macon, Ga.	14	7	21	18	14.5
Savannah, Ga.	12.5	7	19.5	16.5	13
Jacksonville, Fla.	12	8	20	17	12
Miami, Fla.	12	8	20	17	12.5
Pensacola, Fla.	13.5	*9	22.5	19.5	12.5
Tampa, Fla.	12	*9	21	18	12

KYSO GASOLINE

(Third Grade)

Covington, Ky.	11	6	17	14.5	....
Lexington, Ky.	11.5	6	17.5	15	....
Louisville, Ky.	11.5	6	17.5	15	....
Paducah, Ky.	10.5	6	16.5	14	....
Jackson, Miss.	12.5	7	19.5	17	....
Vicksburg, Miss.	10.5	7	17.5	15	....
Birmingham, Ala.	12	*8	20	17.5	....
Mobile, Ala.	8.5	*9	17.5	15	....
Montgomery, Ala.	11.5	*9	20.5	18	....
Atlanta, Ga.	12	7	19	16.5	....
Augusta, Ga.	10	7	17	14.5	....
Macon, Ga.	11	7	18	15.5	....
Pensacola, Fla.	11.25	*9	20.25	17.75	....

Note: With majority of service stations transferred to dealers by S. O. Kentucky, s.s. prices are discontinued and above net dealer prices substituted.

Discounts to tank wagon consumers: Effective Jan. 4, 1937, thru territory, on Crown gasoline, 3c per gal. below consumer t.w. price; on Kyso, 2.5c below.

Discounts on kerosine: Prices in Kentucky are net, but in other states subject to 2c discount.

Taxes: in the tax column is included these city

Above prices include these inspection fees on both gasoline and kerosine, per gallon, figured on basis of 50 gallons per barrel:

Alabama, 1/40c on gasoline, 1/2c on kerosine; Arkansas, 1/5c per gal. in a single barrel. 1/20c per gal. in bulk; Florida, 1/8c; Illinois, 3/100c; Indiana, 1/2c per gal. in a single barrel; 3/10c per gal. in lots of 2 to 10 bbls., 1/5c for 10 to 50 bbls., 2/25c for over 50 bbls.; Kansas, 1/50c, (3/50c can be charged to meet inspection department expenses); Louisiana, 1/32c; Minnesota, 1/25c; Missouri, 3/100c; Nebraska, 3/100c; Nevada, gasoline, 1/20c; North Carolina, 1/4c; North Dakota, 1/20c; Oklahoma, 2/25c per gal., in lots of more than 50 bbls., 1/5c in lots less than 50 bbls.; South Carolina, 1/8c; South Dakota, 1/10c; Tennessee, 2/5c; and Wisconsin, 1/25c.

Kerosine inspection fee only: Iowa, 2/25c; Michigan, 4/5c per gal. for first 2 bbls.; 3/5c for next 3; 2/5c for next 5; 3/10c for next 15, and 1/5c per gal. in lots over 25 bbls.

TANK WAGON, SERVICE STATION MARKETS

Tax column includes 1c federal tax, state gasoline tax, also city and county taxes as indicated in footnotes, and inspection fees, as shown in general footnote. These prices in effect Jan. 11, 1937, as posted by principal marketing companies at their headquarters offices, but subject to later corrections

and county gasoline taxes at the following points: Mobile, 2c city; Birmingham, 1c city; Montgomery, 1c city and 1c county; Pensacola and Tampa, both 1c city. Georgia and Mississippi kerosine prices include 1c state tax. Montgomery kerosine price includes 1c city tax.

**S. O. Kentucky transferred stations to dealers: no prices available.

S. O. Indiana

	Tax	Red Crown Total T.W.	Dealer Prices Red Crown	Stanolind	Kerosine T.W.
Chicago, Ill.	4	15.7	13.7	13.7	9.5
Decatur, Ill.	4	15.7	14.2	14.2	9.5
Joliet, Ill.	4	15.7	14.2	14.2	9.5
Peoria, Ill.	4	15.7	14.2	14.2	9.5
Quincy, Ill.	4	15.5	14	14	9.3
Indianapolis, Ind.	5	17.4	15.9	15.9	‡13
Evansville, Ind.	5	17.2	15.7	15.4	‡14
South Bend, Ind.	5	17.6	16.1	16.1	‡13
Detroit, Mich.	4	14.5	13	13	9.2
Grand Rapids, Mich.	4	16.2	14.7	14.7	10.3
Saginaw, Mich.	4	16	14.5	14.5	10.1
Green Bay, Wisc.	5	17.4	15.9	15.9	10.2
Milwaukee, Wis.	5	17	15.5	13.4	9.8
La Crosse, Wis.	5	17.1	15.6	15.6	9.9
Minneapolis-St. Paul.	4	16.1	14.6	14.6	9.9
Duluth, Minn.	4	16.5	15	15	10.3
Mankato, Minn.	4	16.1	14.6	14.6	9.9
Des Moines, Ia.	4	15.5	14	13.6	9.3
Sioux City, Ia.	4	15.7	14.2	13.6	9.5
Davenport, Ia.	4	15.7	14.2	14.2	9.5
Mason City, Ia.	4	15.9	14.4	14.4	9.7
St. Louis, Mo.	†4	15.4	13.9	13.9	9.2
Kansas City, Mo.	†4	15.1	13.6	13.6	8.3
St. Joseph, Mo.	†4	15.1	13.6	13.6	8.9
Fargo, N. D.	4	17.1	15.6	15.6	10.9
Minot, N. D.	4	18.3	16.8	16.8	12.1
Huron, S. D.	*5	17.5	16.1	16.1	10.3
Wichita, Kans.	4	14.6	13.1	12	8.3

†St. Louis, Kansas City and St. Joseph prices include 1c city tax. ‡Includes 4c state tax.

*South Dakota gasoline and kerosine prices include 0.1c for sales tax.

Note: Effective July 1, 1935 in Iowa, and Sept 11, 1936, in Indiana, Kansas, Michigan, Minnesota, Missouri, South Dakota and Wisconsin, and effective Oct. 1, 1936 in Illinois and North Dakota, S. O. Indiana discontinued posting service station prices, posting only a t.w and a dealer price.

Discount to commercial consumers: Effective Jan. 1, 1935, thru territory, except Michigan effective Feb. 1, on purchases per month, discount off t.w. prices; all gasolines, 25 to 1,000 gals., at t.w. price; 1,000 gals., or more, 1.5c off t.w. on Ethyl and Red Crown, and 0.5c on Stanolind. Minimum delivery is 25 gals.

Subnormal Stanolind Points

Normally Stanolind tank wagon prices are 1c under normal Red Crown t.w. prices. Among subnormal points on Stanolind t.w. are these: Des Moines, 14.1c; Mason City, 13.9c; Huron, 16c; and Wichita, 11.5c, all including state and federal taxes.

S. O. Nebraska

STANDARD RED CROWN GASOLINE

	All Tax	T.W. Total	Dealer Price	Kerosine T.W.
Omaha, Neb.	6	18.1	16.6	9.8
McCook	6	18.8	17.3	10.5
Norfolk	6	18.5	17	10.2
North Platte	6	18.9	17.4	10.6
Scottsbluff	6	19.6	18.1	10.3

Discounts to commercial consumers: for tank wagon deliveries covered only by Standard Commercial Consumer Contract, effective January 1, 1935

S. O. Louisiana

ESSOLENE

	Consumer Tank Car	Dealer T.W.	Tax-es	Posted S.S.	Kerosine T.W.
Little Rock, Ark.	7.5	10	7.5	**	10
Alexandria, La.	7.5	10	8	**	* 9.5
Baton Rouge, La.	7	9.5	8	21	*11.5
New Orleans, La.	7	9.5	*10	23	*11
Lake Charles, La.	8	10.5	8	**	*10
Shreveport, La.	6.5	9	8	**	*10
Lafayette, La.	8	10.5	8	**	*12.5
Bristol, Tenn.	10	11.25	8	**	14.5
Chattanooga, Tenn.	9.5	12	8	**	13.5
Knoxville, Tenn.	10	12.5	8	**	14
Memphis, Tenn.	8	10.5	8	**	12
Nashville, Tenn.	9	11.5	8	**	13

*New Orleans gasoline tax includes 7c state, 1c federal, and 2c parish tax. Louisiana kerosine prices include 1c state tax; in addition New Orleans has 1c parish tax.

**S. O. Louisiana transferred stations to dealers; no prices available.

Price basis to dealers: Undivided dealers get dealer price, less 0.5c.

Price basis to commercial consumers: Effective Dec. 21, 1936, thru territory: commercial consumers taking 50 gals. or more at one time by tank wagon, billed at price equivalent to 2c per gal. over posted consumer tank car price in effect at time and place of delivery; those taking less than 50 gals. at one time will be billed at a price equal to 6c per gal. over posted consumer t.c price.

Humble Oil & Refining Co.

HUMBLE MOTOR FUEL

	*100% Dir. T.W.	Taxes	Total *100% Dir. T.W.	S.S.	Kerosine T.W.
Dallas, Tex.	8.5	5	13.5	17	8.5
Ft. Worth, Tex.	8.5	5	13.5	17	8.5
Houston, Tex.	9	5	14	18	8.5
San Antonio, Tex.	9	5	14	18	8.5

U. S. MOTOR FUEL
(Third Grade)

Dallas, Tex.	7	5	12	14
Ft. Worth, Tex.	7	5	12	14
Houston, Tex.	8	5	13	16
San Antonio, Tex.	8	5	13	16

*Price is t.w. price to contract dealers and commercial consumers. Price to open dealers is 0.5c above t.w. prices shown above.

Price basis to dealers: to contract dealers consumer accounts off posted retail price: when posted retail price, including all taxes on Esso motor fuel is: 19.1c per gal. and above discount is 4c; 19c to 18.1c, 3.5c, and 18c and below, 3c. Humble motor fuel, 17.1c and above, 4c; 17 to 16.1c, 3.5c; and 16c and below, 3c; U. S. motor fuel, 15.1c and above, 3c; 15 to 14.1c, 2.5c; and 14c and below, 2c. To "open" dealer accounts, discounts in each case are 0.5c less on the same price basis.

Continental Oil

	Dealer Prices — Conoco Bronze Ex-Tax	All Tax	Total Conoco Bronze	De-mand	Kerosine T.W
Denver, Colo.	12	5	17	16	11
Grand Junc., Colo.	14.5	5	19.5	18.5	15
Pueblo, Colo.	12	5	17	16	10
Casper, Wyo.	12.5	5	17.5	16.5	11.5
Cheyenne, Wyo.	12.5	5	17.5	16.5	13
Billings, Mont.	15	6	21	20	14.5
Butte, Mont.	13.5	6	19.5	17.5	14.5
Great Falls, Mont.	15	6	21	20	14.5
Helena, Mont.	15	6	21	20	14.5
Salt Lake City, Utah	14	5	19	16	16
Boise, Ida.	14.5	6	20.5	19.5	18
Twin Falls, Ida.	15	6	21	20	18
Albuquerque, N. M.	10.5	†6.5	17	16	12
Roswell, N. M.	11.5	†6.5	18	14.5	10
Santa Fe, N. M.	12.5	*7	19.5	16	12
Muskogee, Okla.	10	5	15	14	8
Oklahoma City, Okla.	10	5	15	14	8
Tulsa, Okla.	10	5	15	13	8
Ft. Smith, Ark.	9.5	5	14.5	13.5	8
Little Rock, Ark.	9.5	7.5	17	16	8
Texarkana, Ark.	9.5	5	14.5	12	8.5

†Includes city tax of 0.5c.
*Includes 1c city tax.

S. O. California

STANDARD GASOLINE

	T.W.	Taxes	Total T.W.	S.S.	Kerosine T.W.
San Francisco, Cal.	13	4	17	18	11.5
Los Angeles, Cal.	12.5	4	16.5	17.5	9
Fresno, Cal.	13.5	4	17.5	18.5	11
Phoenix, Ariz.	14.5	6	20.5	21.5	†16
Reno, Nev.	14.5	5	19.5	20.5	13
Portland, Ore.	13.5	6	19.5	20.5	13.5
Seattle, Wash.	13.5	6	19.5	20.5	13.5
Spokane, Wash.	16.5	6	22.5	23.5	16.5
Tacoma, Wash.	13.5	6	19.5	20.5	13.5

FLIGHT GASOLINE
(Third Grade)

San Francisco, Cal.	11.5	4	15.5	16.5	....
Los Angeles, Cal.	11	4	15	16	....
Fresno, Cal.	12	4	16	17	....
Reno, Nev.	13	5	18	19	....
Phoenix, Ariz.	13	6	19	20	....
Portland, Ore.	12	6	18	19	....
Seattle, Wash.	12	6	18	19	....
Spokane, Wash.	15	6	21	22	....
Tacoma, Wash.	12	6	18	19	....

†Includes 5c state tax.

Discount to dealers: on gasoline, off t.w. price on Standard Ethyl and Standard Gasoline, to 100% dealers, 3c; to split dealers, 2c; on Flight gasoline, both 100% and split dealers, 2c.

On Stanavo Aviation Gasoline, to all classes of dealers, 3c off t. w.

To commercial consumers: off tank wagon price: on single deliveries of 40 gallons and over, advance quantity discount extended at time of delivery on Stanavo Aviation, Standard Ethyl and Standard Gasolines, 3c. Flight Gasoline, 2c per gallon. S.s. schedule applies on single deliveries less than 40 gallons.

On kerosine in tank car, transport truck and trailer delivery, 3c off t.w. price; plant deliveries to jobbers, 2.5c below t.w.

Canada

PRICES OF IMPERIAL OIL LTD.

Per Imperial Gallon, which is 1.2 U. S. Gallons

3-STAR IMPERIAL GASOLINE

	Total T.W.	Taxes	T.W.	S.S.	Kerosine T.W.
Hamilton, Ont.	15	6	21	*	17
Toronto, Ont.	15	6	21	23.5	17
Brandon, Man.	22.8	7	29.8	32.8	22.3
Winnipeg, Man.	21.2	7	28.2	31.2	20.7
Regina, Sask.	22.5	7	29.5	*	22
Saskatoon, Sask.	25.3	7	32.3	*	24.8
Edmonton, Alta.	23.5	7	30.5	33.5	24.2
Calgary, Alta.	21	7	28	31	21.5
Vancouver, B. C.	15	7	22	26	23
Montreal, Que.	12.5	6	18.5	*	17.5
St. John, N. B.	16	8	24	28	18.5
Halifax, N. S.	16	8	24	28	18.5

*Imperial Oil Ltd. transferred stations to dealers; no prices available.

Discounts to Divided Dealers: off s.s. prices: Maritime Provinces, 4c; Ontario, 2½c; Prairie Provinces and British Columbia, 3c, except Vancouver and Victoria, 4c; Quebec, divided dealers pay posted t.w. price. *To Undivided Dealers*: additional 1c discount throughout territory, except in Maritime Provinces.

Aviation Gasoline

Following are tank car and/or tank wagon prices of aviation gasoline in principal marketing territories (Stanavo aviation in all territories except Continental Oil.) Tax column includes 1c federal tax, and state tax; also municipal taxes as indicated in footnotes.

In Effect Jan. 11, 1937

S. O. NEW JERSEY

	Tank Car	T.W.
Bayonne, N. J.	9.5	12
Baltimore, Md.	10	12
Washington, D. C.		12.6
Richmond, Va.		14.2
Greensboro, N. C.		14.7
Raleigh, N. C.		16.6
Charleston, W. Va.		14.2

COLONIAL BEACON OIL CO.

	T.W.
Brooklyn, N. Y.	12.8
Buffalo, N. Y.	14.1
Boston, Mass.	14.5

S. O. PENNSYLVANIA

Philadelphia, Pa.	13.1
Pittsburgh, Pa.	13.9

S. O. LOUISIANA

New Orleans, La.	12.3
Shreveport, La.	12.6

Prices in above four territories do not include state or federal taxes. They are for 74 octane grade aviation gasoline. An 80 octane product generally brings 0.5c premium and an 87 octane product, 1.5c premium over the 74 octane grade.

Note: S.s. prices in above four territories are generally 6c over t.w. prices. Above t.w. prices are net, with no discounts allowed for quantity purchases. T.w. prices are generally tank car price, plus freight, plus 2.5c per gal.

S. O. OHIO

Thru Ohio

	Consumer T.W.	Tax	Total Consumer T.W.
Stanavo Ethyl Aviation:			
73 octane	15.5	5	20.5
80 octane	16.5	5	21.5
87 octane	17.5	5	22.5

Discounts: For delivery on contract to hangar operators and resellers: 2c below commercial consumer posted t.w. price, shown above.

TANK WAGON, SERVICE STATION MARKETS

Tax column includes 1c federal tax, state gasoline tax, also city and county taxes as indicated in footnotes, and inspection fees, as shown in general footnote. These prices in effect Jan. 11, 1937 as posted by principal marketing companies at their headquarters offices, but subject to later corrections

S. O. INDIANA

Chicago, Ill.	14.7	4	18.7
Detroit, Mich.	16.2	4	20.2
Milwaukee, Wisc.	15	5	20
Minneapolis, Minn.	15.1	4	19.1
St. Louis, Mo.	14.4	*4	18.4
Kansas City, Mo.	14.1	*4	18.1
Fargo, N. D.	16.1	4	20.1
Huron, S. D.	15.5	5	20.5

*Includes 1c city tax.
**Includes 0.1c to cover sales tax.

HUMBLE OIL & REFINING CO.

	Tank Car
Baytown, Tex. (exclusive of taxes)	8.5

CONTINENTAL OIL CO.

	Dealer	Tax	Total Dealer
Denver, Colo.	15	5	20
Cheyenne, Wyo.	15.5	5	20.5
Helena, Mont.	17.5	6	23.5
Salt Lake City, Utah	17	5	22
Albuquerque, N. M.	13.5	*6.5	20

*Includes city tax of 0.5c.

S. O. CALIFORNIA

Phoenix, Ariz.	16.5	6	22.5
Los Angeles, Cal.	14.5	4	18.5
San Francisco, Cal.	15	4	19
Reno, Nev.	16.5	5	21.5
Portland, Ore.	15.5	6	21.5
Seattle, Wash.	15.5	6	21.5
Spokane, Wash.	18.5	6	24.5

Note: For discounts, etc., see note under Standard and Flight gasoline above.

Naphtha (In Tank Wagon)

In Effect Jan. 11, 1937

(Net price in Tank Wagon; in Cents per Gallon)

***S. O. NEW JERSEY**

	Mineral Spirits	V.M. & P. Naphtha
Baltimore, Md.	14	15.5
Newark, N. J.	12.5	14.5
Washington, D. C.	14	**17.5

*2c off t.w. prices to large buyers in some instances.
**Steel bbls. only.

SOCONY-VACUUM OIL CO.

Buffalo, N. Y.	*15	15
New York City	10.5	11.5
Rochester, N. Y.	†16	....
Syracuse, N. Y.	**16	....
Boston, Mass.	13	13.5
Bridgeport, Conn.	13	13.5
Providence, R. I.	13	14

*2c off for 50 gals. or more purchase; 3.5c off for 4,000 gals. or more.
†4c off for purchase of 150 gals. or more.
**Less 2c for 150 gals. or more.

ATLANTIC REFINING CO.

Philadelphia, Pa.	11.5	12.5
Lancaster, Pa.	13	14
Pittsburgh, Pa.	12.5	14.5

Note: Prices for Mineral Spirits also apply to Stoddard Solvent; and prices for V. M. & P. Naphtha apply also to Light Cleaners Naphtha.

S. O. OHIO

	S.R. Solvent	V.M. & P. Naphtha
Thru Ohio	13.25	13.75

Note: V.M. & P. Naphtha prices also apply on Dry Cleaners naphtha and special Varnolene; Varnolene and Sohio Solvent 0.5c below these prices. Discounts to contract consumers, off t.w. price: 300 to 999 gals., 0.5c; 1,000 to 2,499 gals., 0.75c; 2,500 to 4,999 gals., 1c; 5,000 or more gals. 1.5c.

S. O. INDIANA

	Oleum Spirits	V.M. & P. Naphtha	Stanisol
Chicago, Ill.	16.5	16.8	15.3
Detroit, Mich.	18.2	19.3	18.3
Kansas City, Mo.	13.6	14.6	13.6
St. Louis, Mo.	13.9	14.9	13.3
Milwaukee, Wis.	18.5	19.5	18.5
Minneapolis, Minn.	17.6	18.6	15.7

Note: Prices for V. M. & P. apply also to Light Cleaners Naphtha. All prices, with exception of Missouri points, include state tax. Prices shown are base prices, before discounts.

Naphtha (In Tank Cars)

In Tank Cars (F. o. b. refinery or seaboard terminal except Ohio, delivered price.)

	V.M. & P. Naphtha	Solvent
Baltimore	10	9.5
New York Harbor	10	9
Philadelphia district	10	9.5
Providence	10	9.5
Ohio points, delivered	9.25	*8.75

*This is on S.R. solvent.
Note: In Ohio, prices on D.C. naphtha and special Varnolene are same as V.M & P.; on Varnolene and Sohio Solvent, prices are 0.5c less than on V.M. & P.

Latest Changes

From Jan. 5 to Jan. 11 inclusive. Dates and amounts of changes shown. See table for full current prices. Changes are on gasoline unless kerosine is indicated.

S. O. New Jersey—Fuel Oil:

Newark, t.w. Nos. 2, 3 and 4, up 0.25c, Jan. 7.

Baltimore, t.w. Nos. 2, 3 and 4, up 0.5c, Jan. 6.

Washington, t.w. Nos. 2, 3 and 4, up 0.25c, Jan. 6.

Kerosine:

Norfolk up 0.2c, Jan. 6.

Socony-Vacuum:

Consumer tank car prices posted in this issue.

Atlantic Refining—Kerosine:

Thru Delaware and Pennsylvania, up 0.5c, Jan. 7.

S. O. Kentucky—Kerosine:

Vicksburg, up 0.5c, Jan. 5.

S. O. Louisiana—Kerosine:

Advanced to normal or near normal levels, thru Tennessee, advance ranging from 1c to 3c. Points affected were Memphis, up 2.5c; Chattanooga, up 2c, Nashville up 3c, Jan. 11.

Corrections

Notation of amount of change and dates not previously shown in table. Table in this issue is corrected to show these changes. Changes are on gasoline unless kerosine is indicated.

S. O. Kentucky—Gasoline:

Up 1c in Tampa, due to 1c city license tax on dealers, effective Dec. 22.

Crown:

Birmingham, t.w. and s.s. have been 19c and 21c, respectively, from Nov. 24 and up to end of year.

Kerosine:

Pensacola, up 0.5c, Jan. 4.

S. O. Indiana—Red Crown:

Decatur, t.w. up 0.9c, Jan. 1.
Huron, t.w. cut 0.1c, Jan. 1.

Stanolind:

Decatur, dealer price, up 0.9c, Jan. 1.

Sioux City, dealer price, cut 0.6c, Nov. 3.

Kerosine and Aviation:

Huron, cut 0.1c, Jan. 1.

S. O. Louisiana—Essolene:

S.s. prices discontinued and stations transferred to dealers, Memphis, Tenn., Jan. 1.

Continental Oil—Aviation:

Beginning in this issue dealer prices are shown.

Fuel Oil

(*Continued from page* 35)

when Mid-Continent crude prices failed to advance generally. But since supplies were limited, prices remained fairly steady.

* * *

CHICAGO, Jan. 9.—Light fuel oil prices were higher in the Mid-Western market the first week of 1937. Colder weather and absence of offerings caused the advance.

Open market buying, however, was light most of the week. Indications were that buyers had placed orders late in December, specifying shipment after Jan. 1 to escape the 1c per cwt. emergency freight surcharge. Consequently, little new buying was apparent after Jan. 1.

Reports from the territory generally indicated that jobber storage was well filled. Two of the larger buyers in the Middle West said that they were gradually pulling on storage of light fuel oils; that future purchases were dependent solely on weather conditions. If the balance of winter is mild, they believed that current storage would carry them through the heating oil season.

Many sellers here expect the automobile strike to have some effect on heavy fuel markets. As yet the effect, if any, has been only nominal as far as this market is concerned. Michigan refiners would be the first to feel the loss of this business, traders believed. Current orders were keeping a good balance in the heavy fuel oil market. Prices were steady.

Oil From Scotland's Coal

WASHINGTON, Jan. 11.—Cannel coal deposits in the Lothians and Fife, Scotland, are capable of producing 70,000,000 barrels of motor fuel per year for 45 years under hydrogenation processes, according to reports to the Commerce Department, based on studies by the Coal Committee of the Scottish Development Council.

The committee recently conducted a survey of the cannel, said to be rich in hydrogen content and of value as a source of gas, and reported some 77,000,000 tons in the cannel reserves, from each ton of which 40 gallons or more of oil could be extracted.

SEABOARD MARKETS, EXPORT AND COASTWISE

Prices do not include Federal tax. Where $ mark is shown, prices are per barre of 42 U. S. gallons

Eastern Domestic

(Prices in cents per gallon tank car lots, unless otherwise noted, f.o.b. refinery or seaboard terminal, representing majority of quotations or sales. Inter-refinery and export prices not included. Florida and S. Carolina inspection tax not included)

*MOTOR GASOLINE

Prices Jan. 11	†60-64 Octane	†65 Octane and Above
New York harbor	6.50	6.75
New York harbor, barges	6.25	6.50
Philadelphia district	6.50	6.75
Baltimore district	6.50	6.75
Norfolk district	6.50 - 6.75	7.00
Wilmington, N. C. district	6.75	7.00
Charleston, S. C. district	6.75	7.00
Savannah district	6.75	7.00
Jacksonville district	6.75	7.00
Portland district	6.75 - 7.00	7.00 - 7.25
Boston district	6.50	6.75
Boston district, barges	6.25	6.50
Providence district	6.50	6.75
Providence district, barges	6.25	6.50

*Due to lack of companies offering U. S. Motor gasoline, 59 octane and below in the open market, prices for this grade are discontinued. Quotations nominally are 0.25c below those for 60-64 octane grade.

†Nominal.

†WATER WHITE KEROSINE

Prices Jan. 11

New York harbor	5.50 - 5.75	Savannah district	5.50 - 5.75
N. Y. harbor, barges	5.375- 5.625	Jacksonville district	5.50 - 5.75
Philadelphia district	5.50	Portland district	6.00 - 6.25
Baltimore district	5.50 - 5.75	Boston district	5.50 - 5.75
Norfolk district	5.50 - 5.75	Boston dist., barges	5.375- 5.625
Wilmington, N. C.	5.50 - 5.75	Providence district	5.50
Charleston, S. C. dist.	5.50 - 5.75	Providence, barges	5.375

*FUEL OILS

Prices Jan. 11	New York harbor	New York harbor, barges	Philadelphia district
†No. 1	5.50 - 5.75	5.375- 5.625	5.50
†No. 2	4.75	4.625	4.75
†No. 3	4.75	4.625	4.75
†No. 4	4.50	4.375	4.50
No. 5 (per barrel)	$1.35	.....	$1.42
No. 6 (per barrel)	$1.15	.....	$1.15

	Baltimore district	Boston district
†No. 1	5.50 - 5.75	5.50 - 5.75
†No. 2	4.75	4.75
†No. 3	4.75	4.75
†No. 4	4.50	4.75
No. 5 (per barrel)	$1.35	$1.45
No. 6 (per barrel)	$1.15	$1.15

	Boston dist., barges	Providence district	Providence dist., barges
†No. 1	5.375- 5.625	5.50	5.375
†No. 2	4.625	4.75	4.625
†No. 3	4.625	4.75	4.625
†No. 4	4.625	4.25 - 4.50	4.125- 4.375

*Fuel oils meet specifications of U. S. Commercial Standards CS12-35

†Nominal.

	Bunker Oil Grade C Per Barrel	Diesel Oil Ships' Bunkers Per Barrel	Gas Oil 28-34 Gravity Per gallon	Diesel Oil Shore Plants Per gallon
New York harbor	*$1.15	*$1.85	4.75	4.75
Philadelphia dist.	*$1.15	*$1.85-$2.00	4.75	....
Baltimore district	*$1.15	*$1.85	4.75	....
Norfolk district	*$1.15	*$1.995	4.75	....
Charleston district	$1.10	$1.85	....	....
Savannah district	$1.10	$1.89	....	4.75
Jacksonville dist.	$1.10	$1.995	....	4.75
Tampa district	$1.10	$1.995	....	....
Portland district	$1.25	$1.95	....	....
Boston district	$1.15	*$1.85	....	....
Providence district	$1.15	$1.85	.....	....

*Lighterage for bunker oil, 5c per bbl. additional; or Diesel oil, 6.5c per bbl. additional.

Pacific Export

(Quotations are at seaboard, Los Angeles, in cargo lots, cents per gallon, except where otherwise noted.)

Prices—	Jan. 11	Jan. 4	Dec. 28
53-55 U. S. Motor	5.00 - 5.25	5.00 - 5.25	5.00 - 5.25
400 e.p. blend 65 Octane and above	5.25 - 5.75	5.25 - 5.75	5.25 - 5.75
38-40 w.w. kerosine, 150 fire point	4.25 - 5.00	4.25 - 5.00	4.25 - 5.00
41-43 w.w. kerosine	4.50 - 5.00	4.50 - 5.00	4.50 - 5.00
44 water white kerosine	5.00	5.00	5.00
Prime white kerosine	3.50 - 4.25	3.50 - 4.25	3.50 - 4.25
In Cargo lots, per barrel			
Diesel fuel oil, above 23.9°	$1.00 -$1.15	$1.00 -$1.15	$1.00 -$1.15
Diesel fuel oil, under 23.9°	$0.95 -$1.10	$0.95 -$1.10	$0.95 -$1.10
30-34 gas oil	$1.05 -$1.15	$1.05 -$1.15	$1.05 -$1.15
Grade C fuel oil	$0.75 -$0.90	$0.75 -$0.90	$0.75 -$0.90
Pacific Export (cont'd)	Jan. 11	Jan. 4	Dec. 28
In Ships' Bunkers, or deep tank lots, per barrel:			
Diesel fuel oil, above 23.9 gravity	$1.00 -$1.16	$1.00 -$1.16	$1.00 -$1.16
Diesel, under 23.9 gravity	$0.95 -$1.06	$0.95 -$1.06	$0.95 -$1.06
Grade C fuel oil	$0.90 -$0.95	$0.90 -$0.95	$0.90 -$0.95
Cased Goods:			
Gasoline, U. S. Motor	$1.30 -$1.50	$1.30 -$1.50	$1.30 -$1.50
Gasoline, 400 e.p. blend	$1.45 -$1.65	$1.45 -$1.65	$1.45 -$1.65
38-40 w.w. kerosine, 150 fire point	$1.10 -$1.25	$1.10 -$1.25	$1.10 -$1.25
Kerosine, prime white	$1.05 $1.15	$1.05 -$1.15	$1.05 -$1.15

New York Export

(Prices in cents per gallon in barrels, F.a.s. New York

CYLINDER OILS (Pennsylvania Products)

Bright stock:			
Light, 25 pour point	28.00	27.50	27.50
Dark, 25 pour point	27.50	27.00	27.00
Neutral oil:			
200 3 color, 25 pour point	30.00	29.50 -30.00	29.50
150 3 color, 25 pour point	26.50	26.00 -26.50	26.00
600 Warren E filtered	23.00	22.50 -23.00	22.50 -23.00
600 stm. rfd., unfiltered	20.50	20.00 -20.50	20.00
650 stm. rfd. unfiltered	22.00	21.50	21.50
600 flash, steam refined	23.00	22.50	22.50
630 flash, steam refined	24.00	24.00	24.00

Wax Domestic *and* Export

(Prices in cents per pound. Tests made by A. S. T. M. methods. Melting points shown below, however, are A. M. P., 3° higher than A. S. T. M. (E. M. P.) melting points. Export prices are f.a.s. carload lots. Domestic prices are f.o.b refineries in New York and New Orleans districts, in bags, carload lots, with 0.2c discount allowed for shipment in bulk. Scale solid and fully refined slabs in bags.)

	New York		New Orleans	
Prices Jan. 11	Domestic	Export	Domestic	Export
124-6 Y.C. scale	2.45	2.45	2.45	2.45
122-4 W.C. scale	2.45	2.45	2.45	2.45
124-6 W.C. scale	2.45-2.50	2.45 - 2.50	2.45 - 2.50	2.45 - 2.50
123-5 Fully refined	4.45	4.125	4.45	4.125
125-7 Fully refined	4.55	4.25	4.55	4.25
128-30 Fully refined	4.80	4.50	4.80	4.50
130-2 Fully refined	5.05	4.75	5.05	4.75
133-5 Fully refined	*5.35	5.25	*5.35	5.25
135-7 Fully refined	*5.60	5.50	....	....

*Shipment either in bags or in bulk.

Gulf Coast

(Prices are f.o.b. ship at Gulf oil terminals representing opinions of majority of traders, except prices specified to the contrary. Prices cover bulk shipments of 20,000 barrels or more, unless otherwise noted.)

MOTOR GASOLINE

For Domestic Shipment

Prices—	Jan. 11	Jan. 4	Dec. 28
59 octane and below	5.375- 5.50	5.375- 5.50	5.375- 5.50
60-64 octane number	5.625- 5.75	5.625- 5.75	5.625- 5.75
65 octane and above	*5.875- 6.00	*5.875- 6.00	5.875

FUEL OILS

No. 1 Fuel oil	*5.25	†5.25	4.75
No. 2 Fuel oil	*4.00	*4.00	*3.75 - 3.875
No. 4 Fuel oil	*3.75	*3.75	*3.625

†Sale only.

KEROSINE

41-43 w.w.	*5.25 - 5.50	*5.25 - 5.50	*4.75 - 5.00

GASOLINE

For Export Shipment

U. S. Motor gasoline	5.25	5.25	5.125
60-62, 400 e.p. gasoline	5.375	5.375	5.25
61-63, 390 e.p. gasoline	5.50 - 5.625	5.50 - 5.625	5.375
64-66, 375 e.p. gasoline	5.75	5.75	5.625

KEROSINE

44 water white	*5.25 - 5.50	*5.25 - 5.50	*5.00
41-43 water white	*5.25 - 5.50	*5.25 - 5.50	*4.75 - 5.00
41-43 prime white	*5.00 - 5.25	*5.00 - 5.25	4.625

*Nominal.

(Continued on next page)

SEABOARD MARKETS, EXPORT AND COASTWISE

Prices do not include Federal tax. Where $ mark is shown, prices are per barrel of 42 U. S. gallons

(Continued from preceding page)

GAS AND BUNKER OILS

Prices—	Jan. 11	Jan. 4	Dec. 28
For Domestic and/or Export Shipment			
*26-30 translucent gas oil	3.75	3.75	3.50
*30 plus translucent gas oil	4.00	4.00	3.625- 3.75
*30 plus transp. gas oil	4.00	4.00	3.75
Diesel Oil Ships' bunkers	$1.50	$1.50	$1.50
Grade C bunker oil, for ship's bunkers, per bbl.	†$0.95	†$0.95	†$0.95
Grade C bunker oil, per bbl. in cargoes	$0.95	$0.95	$0.95

*Less than ½ of 1% sulphur. †Lighterage 5c p r bbl. additional

MEXICAN CRUDE AND BUNKER OILS

(F.o.b. Steamer, Tampico)

Heavy Panuco crude, taxes to be paid, per bbl.	$1.10	$1.10	$1.07 -$1.10
Grade C bunker oil, ship's bunkers, taxes paid, per bbl.	$0.97	$0.97	$0.97

MID-CONTINENT LUBRICATING OILS

(Prices in cents per gallon in bbls. f.a.s. Gulf oil terminals. In drums and new barrels, 0.5c to 1c higher per gal. in some instances.)

190-200 vis. D 210 bright stock	26.00	26.00	26.00
150-160 vis. D 210 bright stock:			
0-10 pour point	23.00	23.00	23.00
10-25 pour point	22.50	22.50	22.50
25-40 pour point	22.00	22.00	22.00
150-160 vis E 210 brt. stock	22.00	22.00	22.00
120 vis. D 210 bright stock	21.00	21.00	21.00
180 vis. No. 3 color neutral Oil:			
0-10 pour point	16.50	16.50	16.50
15-30 pour point	16.00	16.00	16.00
200 vis. No. 3 color neutral Oil:			
0-10 pour point	17.00	17.00	17.00
15-30 pour point	16.50	16.50	16.50

Mid-Continent Lubricating Oils (Cont'd.)

Prices—	Jan. 11	Jan. 4	Dec. 28
600 s.r. olive green	12.25	12.25	12.25
600 s.r. dark green	11.00	11.00	11.00
631 s.r.	18.00 -18.50	18.00 -18.50	18.00 -18.50

SOUTH TEXAS LUBRICATING OILS

(Viscosity at 100° F., pour point 0. Tanker, f.o.b Gulf oil terminals, for export shipment)

Unfilterable Pale Oils:			
Vis. Color			
100 No. 3	5.00 - 5.25	5.00 - 5.25	5.00 - 5.25
200 No. 3	6.00 - 6.50	6.00 - 6.50	6.00 - 6.50
300 No. 3	6.50 - 7.00	6.50 - 7.00	6.50 - 7.00
500 No. 3½	7.50 - 7.875	7.50 - 7.875	7.50 - 7.875
750 No. 4	8.75 - 9.00	8.75 - 9.00	8.75 - 9.00
1200 No. 4	9.00 - 9.25	9.00 - 9.25	9.00 - 9.25
2000 No. 4	9.75 -10.00	9.75 -10.00	9.75 -10.00
Red Oils:			
Vis. Color			
100 No. 5-6	5.00 - 5.25	5.00 - 5.25	5.00 - 5.25
200 No. 5-6	5.875- 6.50	5.875- 6.50	5.875- 6.50
300 No. 5-6	6.25 - 6.75	6.25 - 6.75	6.25 - 6.75
500 No. 5-6	7.25 - 7.50	7.25 - 7.50	7.25 - 7.50
750 No. 5-6	8.75 - 9.00	8.75 - 9.00	8.75 - 9.00
1200 No. 5-6	8.75 - 9.25	8.75 - 9.25	8.75 - 9.25
2000 No. 5-6	9.75 -10.00	9.75 -10.00	9.75 -10.00

Note: Red oil prices shown above cover oils with green cast; prices for blue cast red oils are slightly lower in some cases.

Tanker Rates

(Approximate tanker freight rates to Continental ports, in shillings per ton of 2240 pounds. British sterling; to U. S. ports cents per barrel)

	Crude &/or Fuel		Refined Oil &/or Spirits	
Rates—Jan. 11	Last Paid	Owners Ask	Last Paid	Owners Ask
Calif.-U.K./Cont.*	20/	20/ 21/	21/	†21/
Gulf-U.K./Cont.*	13/6	13/5-14/4	14/	14/
Calif N. Atlantic (not E. of N. Y.)	....	†85c-90c	....	†90c
Gulf-N. Atlantic** (not E. of N. Y.):				
Heavy Crude & Fuel, (10 to 19.9 gravity)	42c	42-43c	....	....
Light Crude, (30 gravity or lighter)	38c	†38-39c	....	....
Gasoline	....	....	41c	41-42c
Kerosine	....	....	43c	43-44c
Light Fuel	....	....	44c	44-45c

Notes: Dirty boat quotations are enlarged to cover, "Fuel and Light Crude" quotations.

*Continental ports in range between Bordeaux and Hamburg, both inclusive

**Venezuela loading same rate: Tampico 2c to 3c per bbl additional.

†Nominal.

California

(Continued from page 35)

to $1.10 a barrel, independent refiners with plants in the Los Angeles Basin advanced their quotations for smudging oil to between $1.10 and $1.30 a barrel. Major company quotations on this product remained unchanged at $1.47.

Bulk quotations on competitive brands of gasoline were easier. Small quantities of off-color, low-grade gasoline were available at an independent plant in the Basin at 11 cents, inclusive of 4 cents tax, at the rack. This was the lowest price reported in several months, even for so-called "bootleg" gasoline.

So far, these distress offerings had had no effect on the Basin gasoline price structure and no other independent refiner was expected to meet the price. A much more serious market factor was the considerable quantity of unbranded gasoline offered at 11.5 cents at the rack, or 11.75 cents delivered by tank wagon in Orange and Los Angeles counties. Truck and trailer deliveries of this gasoline, which was sold without resale price restrictions, caused a renewal of the price war in the San Diego district. The trouble there, however, was strictly local and was not expected to spread northward into the Imperial Valley.

Tank wagon deliveries of major company third grade brands of gasoline in the Basin area remained nominally at 13 cents, although rebrands of these products were reported available at 12 cents in highly competitive sections of Los Angeles.

With the exception of Fresno, which has been the center of price-cutting activities many times, the San Joaquin Valley was in better shape than previously and bulk gasoline prices were generally held to the normal differential of 0.5 cent over Basin quotations.

Natural gasoline prices were unchanged at 7.25 to 7.5 cents. Although contracts for this product were offered at 7.25 cents, spot sales were usually figured at 7.5 cents.

Kerosine and kerosine-distillate were irregular at independent plants. Small quantities of k. d. stock were reported available at fractionally under 3 cents, but the average price was believed to be better than 3.25 cents. Pacific Coast seaboard markets were inactive, with no important changes in quotations.

Williams In Hospital

INDIANAPOLIS, Jan. 9.—Phil Williams, Gaseteria, Inc., was operated on recently, and will be in a local hospital for about three weeks.

Tax Yield Gains

TORONTO, Jan. 11.—Ontario's six cents a gallon gasoline tax yielded the province $583,657 more up to Dec. 5, 1936, than in the corresponding period of 1935. Total tax collected to Dec. 5 last, was $12,036,658.

Canadian Imports Up

TORONTO, Jan. 12.—A gain of 15.4 per cent in the value of imports of petroleum and its products featured Canada's import statistics for October, 1936, as compared with October, 1935. Value of importations for last October were $6,121,506, of which 76.6 per cent came from the U. S.

More Gasoline Used

TORONTO, Jan. 11.—Gasoline consumption in Ontario amounted to 239,250,000 imperial gallons for the ten months ending with October last. This compared with 230,739,000 gallons for the corresponding period of 1935. Consumption for October, 1936, was 27,617,000 gallons.

New "Co-Op" Oil Plant

INDIANAPOLIS, Jan. 9.—A new lubricating oil blending plant is being planned by the Indiana Farm Bureau. It is expected to be built in Indianapolis at a cost of about $150,000.

CRUDE OIL MARKETS

Prices in $ per bbl. o 42 U. S. gals. at the well. A. P. I. gravity. Prices are effective as of 7 a. m. of dates as given

EASTERN FIELDS

Posted by Joseph Seep Purchasing Agency

(Effective Dec. 28, 1936, except Corning Sept. 18, 1936)

Penna. Grade Oil in Southwest Penna. Pipe Lines.....$2.32
Penna. Grade Oil in Eureka Pipe Lines (West Virginia).....$2.27
Penna. Grade Oil in Buckeye Pipe Lines (Mackaburg, O.).....$2.12
Corning Oil in Buckeye Pipe Lines (Ohio)...$1.32

Posted by Other Companies

Tide Water Pipe Co., Ltd.
Bradford-Allegany district (Penna. and N. Y.) (Effective Dec 28, 1936).....$2.57
*The Pennzoil Co.: (Effective Dec. 28, 1936)
Penna. Grade Oil in National Transit Lines*$2.57
Ashland Oil & Transportation Co.:
Somerset Oil in Ashland Lines (Ky.): (Effective Jan. 9, 1936)
Big Sandy River.....$1.30
Kentucky River.....$1.38
*The Pennzoil Co. posts $2.57 in Cochran, Franklin, Hamilton and Doolittle, Pa. fields; prices in other lower districts range down to $2.52 per bbl. at well.

MICHIGAN

Posted by Pure Oil Co.

Midland, Midland County (Sept. 16, 1936)..$1.32

Posted by Simrall Pipe Line Corp.

(Effective Sept. 16, 1936)
West Branch and equal grades.....$1.16
Beaverton, Crystal, Greendale, Porter and equal grades.....$1.32

CENTRAL STATES FIELDS

Posted by Ohio Oil Co.

(Effective Jan. 9, 1936)
Illinois, Princeton.....$1.23
(Effective Sept. 22, 1936)
Lima.....$1.15
(Effective Nov. 1, 1936)
Owensboro (Western Ky.).....$1.28

Posted by Stoll Oil Refining Co.

(Effective Jan. 9, 1936)
Stoll Pipe Line Oil (Ky.).....$1.28

CANADIAN FIELDS

Posted by Imperial Oil Limited

Western Ontario

(Effective Sept. 9, 1933)
Petrolia.....$2.10
Oil Springs.....$2.17

Alberta—Turner Valley

(Prices f.o.b. field tankage)
(Effective Dec. 16, 1936)
Clear Naphtha.....$2.60

Crude Oil & Discolored Naphtha

40-40.9°	$1.55	53-53.9	$1.94
41-41.9	1.58	54-54.9	1.97
42-42.9	1.61	55-55.9	2.00
43-43.9	1.64	56-56.9	2.03
44-44.9	1.67	57-57.9	2.06
45-45.9	1.70	58-58.9	2.09
46-46.9	1.73	59-59.9	2.12
47-47.9	1.76	60-60.9	2.15
48-48.9	1.79	61-61.9	2.18
49-49.9	1.82	62-62.9	2.21
50-50.9	1.85	63-63.9	2.24
51-51.9	1.88	64-64.9	2.27
52-52.9	1.91	65° & higher, for discolored naphtha only	2.36

Note: Clear naphtha: 22 color; 10 lbs. vapor pressure, Reid method; 90% recovery; end point, 410°. Discolored naphtha: same specifications as for clear naphtha except color.

MID-CONTINENT

Posted by Stanolind Crude Oil Purchasing Co., Jan. 9, 1936 and by Continental Oil Co., Jan. 4, 1937

	(In Oklahoma-Kansas)		(In North-North Central Texas)	
	Stanolind	Continental	Stanolind	Continental
Below 29	$0.94	$1.11	$0.84	$1.01
29-29.9	0.96	1.13	0.86	1.03
30-30.9	0.98	1.15	0.88	1.05
31-31.9	1.00	1.17	0.90	1.07
32-32.9	1.02	1.19	0.92	1.09
33-33.9	1.04	1.21	0.94	1.11
34-34.9	1.06	1.23	0.96	1.13
35-35.9	1.08	1.25	0.98	1.15
36-36.9	1.10	1.27	1.00	1.17
37-37.9	1.12	1.29	1.02	1.19
38-38.9	1.14	1.31	1.04	1.21
39-39.9	1.16	1.33	1.06	1.23
40 & above	1.18	1.35	1.08	1.25

Above Stanolind prices met as follows:

Jan. 9, by The Texas Co. in all above fields.

Continental Oil Co.'s prices were met the same day by Barnsdall Oil Co. and Globe Oil & Refining Co.

Note: Stanolind prices in Okla.-Kans. are for quantities computed by 97% tank tables. In Texas, 99% tank tables are used, volume corrected to 60° F., and deduction for full b.s. & w. content.

Posted by Carter Oil Co.

In Oklahoma

(Effective Jan. 9, 1936)

Below 25	$0.86	33-33.9	$1.04
25-25.9	0.88	34-34.9	1.06
26-26.9	0.90	35-35.9	1.08
27-27.9	0.92	36-36.9	1.10
28-28.9	0.94	37-37.9	1.12
29-29.9	0.96	38-38.9	1.14
30-30.9	0.98	39-39.9	1.16
31-31.9	1.00	40 and above	1.18
32-32.9	1.02		

Jan. 9, Carter's Oklahoma gravity and price schedule met in Oklahoma-Kansas by Sinclair-Prairie, and Humble's West Central Texas schedule met in North and North Central Texas where Sinclair-Prairie buys. Same day, Shell Petroleum met Carter in full in Oklahoma-Kansas.

Posted by Magnolia Petroleum Co.

(Effective Jan. 9, 1936)

In Oklahoma, same schedule as Carter Oil, which see above, beginning with below 25, at $0.86 and ending with 40 & above, at $1.18.

In Texas: North and North Central, including Burkburnett, Archer, Stephens, Henrietta, Electra, Comanche and Olden; and in Central Texas, including Mexia, Wortham, and Panola county, same gravity and price schedule as Humble in West Central Texas, which see below, beginning with below 29 at $0.84, and ending with 40 and above, at $1.08.

Posted by Humble Oil & Refining Co.

TEXAS FIELDS

(**West Central Texas*)

(Effective Jan. 9, 1936)

Below 29	$0.84	35-35.9	$0.98
29-29.9	0.86	36-36.9	1.00
30-30.9	0.88	37-37.9	1.02
31-31.9	0.90	38-38.9	1.04
32-32.9	0.92	39-39.9	1.06
33-33.9	0.94	40 and above	1.08
34-34.9	0.96		

*Includes Brown, Callahan, Coleman, Comanche, Eastland, Fisher, Haskell, Jones, Shackelford, Stephens, Throckmorton and Young counties.

Shell Petroleum Corp., on Jan. 9, met Humble in Fisher county, except that Shell posts five lower grades, beginning with below 25 gravity at $0.76; 25-25.9, $0.78; 26-26.9, $0.80; 27-27.9, $0.82; and 28-28.9, $0.84; rest of schedule same as Humble's in West Central Texas.

†Effective Dec. 1, 1934, Humble prices are based on 99% tank tables at 60F. Allowance or deduction of 1% is made for each 25° change in temperature above or below 60F.

**East Central Texas*

(Effective Jan. 9, 1936)

Below 29	$0.91	35-35.9	$1.05
29-29.9	0.93	36-36.9	1.07
30-30.9	0.95	37-37.9	1.09
31-31.9	0.97	38-38.9	1.11
32-32.9	0.99	39-39.9	1.13
33-33.9	1.01	40 and above	1.15
34-34.9	1.03		

*Including Anderson, Cherokee, Limestone, Navarro and Van Zandt counties.

Stanolind Oil & Gas Co., Jan. 20, posted in Marion County (East Central Texas), below 29 oil at $0.86, plus 2c differential, to 40 and above at $1.10.

Jan. 9, Sinclair-Prairie met Humble's prices in Mexia.

PANHANDLE TEXAS

Posted by Humble Oil & Refining Co.

(Effective Jan. 9, 1936)

	Gray County	Carson-Hutchinson
Below 35	$0.86	$0.81
35-35.9	0.88	0.83
36-36.9	0.90	0.85
37-37.9	0.92	0.87
38-38.9	0.94	0.89
39-39.9	0.96	0.91
40 & above	0.98	0.93

Jan. 9, above prices met by Sinclair-Prairie, Magnolia and The Texas Co. in the entire area.

Effective Jan. 4, 1937 Continental Oil posted 17c over Humble's prices in Carson-Hutchinson beginning with $0.98 for below 35 gravity, with 2c differential up to 40 & above, at $1.10.

EAST TEXAS

(Effective Jan. 9, 1936)

Stanolind, Humble, Shell, Sinclair-Prairie, Texas, Sun Oil and Magnolia.....$1.15

Shell also posted on Jan. 9, in Livingston area, Polk County, Texas, $1.15.

NORTHEAST TEXAS

(Posted by Humble, Nov. 1, 1936)

Talco.....$0.65

(Posted by Magnolia, May 1, 1936)

Cass County (Rodessa field):
Below 29.....$0.86
29-29.9..... 0.88

Rest of schedule same as S. O. La. posts in Rodessa, which see in column at right.

WEST TEXAS AND NEW MEXICO

Posted by Humble Oil & Refining Co.

(Effective Jan. 14, 1936)

(Including Andrews, Crane, Crockett, Ector, Glasscock, Howard, Winkler and Upton Counties, Texas and Lea county, New Mexico).

Below 29	$0.75	33-33.9	$0.84
29-29.9	0.76	34-34.9	0.86
30-30.9	0.78	35-35.9	0.88
31-31.9	0.80	36 and above	0.90
32-32.9	0.82		

Pecos, West Texas.....$0.85

Jan. 16, Magnolia met Humble in Crane, Upton, Howard, Glasscock. Mitchell and Winkler.

Jan. 9, Texas Co. posted Winkler and Lea counties at $0.85; Crane and Upton, $0.80.

Shell Petroleum Corp., on Jan. 23, met Humble in Crane, Glasscock, Howard, Pecos (except Yates shallow pool), Winkler, and Upton counties, Tex., and in Lea County, N. Mex. On Jan. 9, Shell posted in Yates shallow pool in Pecos county, Tex., $0.75.

Posted by Continental Oil Co.

(Effective Jan. 4, 1937)

Artesia, Jackson and Maljamar pools, N. M...$0.97

COLORADO

(Posted by Continental Oil Co.,

Effective Jan. 4, 1937)

Ft. Collins and Wellington

Below 29	$1.06	35-35.9	$1.20
29-29.9	1.08	36-36.9	1.22
30-30.9	1.10	37-37.9	1.24
31-31.9	1.12	38-38.9	1.26
32-32.9	1.14	39-39.9	1.28
33-33.9	1.16	40 & above	1.30
34-34.9	1.18		

Cannon City and Florence, Col.....$1.15

SOUTH AND SOUTHWEST TEXAS

Posted by Humble Oil & Refining Co.

(Effective Jan. 14, 1936)

Darst Creek	$0.9/	Pettus	$1.25
Salt Flat	0.97	Tomball	1.30

(Effective Nov. 1, 1936)

Saxet	$0.95	Mirando	$0.90
Heyser heavy	0.90	Placedo heavy	0.90
Heyser light	1.15	Taft	0.95

Shell Pet. Corp. on Jan. 9, posted $0.97 in Salt Flat district, Tex.

*Anahuac and *Dickinson (including Flour Bluff, Nov. 1, 1936)

(Effective Jan. 9, 1936)

30-30.9	$1.04	36-36.9	$1.16
31-31.9	1.06	37-37.9	1.18
32-32.9	1.08	38-38.9	1.20
33-33.9	1.10	39-39.9	1.22
34-34.9	1.12	40 and above	1.24
35-35.9	1.14		

*Anahuac in Chambers county; Dickinson Galveston.

Jan. 9, The Texas Co. posted $0.97 for Darst Creek.

Jan. 9, Magnolia posted $0.97 in Darst Creek; $1.30 in Tomball; $0.90 in Luling; $1.00 in Lytton Springs; $1.10 for Cleveland, Liberty county, Tex.; $1.03 in Hardin, Liberty county, Tex. Nov. 1, 1936, posted $0.90 for Mirando, Tex.

Posted by Humble

Conroe and Raccoon Bend

(Deep sand crudes)

(Effective Jan. 9, 1936)

35-35.9	$1.24	38-38.9	$1.30
36-36.9	1.26	39-39.9	1.32
37-37.9	1.28	40 and above	1.34

Jan. 9, Texas Co. met above prices.

NORTH LOUISIANA-ARKANSAS

Posted by Standard Oil Co. of Louisiana

(Effective Jan. 10, 1936)

(In Caddo, Homer, Haynesville, Sabine, De Soto, Rodessa, Sarepta, Carterville, El Dorado, and Miller county).

Below 25	$0.78	33-33.9	$0.96
25-25.9	0.80	34-34.9	0.98
26-26.9	0.82	35-35.9	1.00
27-27.9	0.84	36-36.9	1.02
28-28.9	0.86	37-37.9	1.04
29-29.9	0.88	38-38.9	1.06
30-30.9	0.90	39-39.9	1.08
31-31.9	0.92	40 and above	1.10
32-32.9	0.94		

Smackover, Ark.....$0.75
Nevada, Ark..... 0.65
Urania, La. (La. Oil Refg. Co., Jan. 10, '36)... 0.97
Tepetate, La. (Continental Oil, Jan. 9, '36)... 1.12

The Texas Co., effective Jan. 9, posted in No. La.-Ark. same prices as Humble posts in West Central Texas. It also posted $0.80 for Smackover and $1.12 for La Fitte, La.

Magnolia Petroleum Co., effective Jan. 16, posted on No. La.-Ark. crude, prices beginning with $0.86 for below 29 gravity, plus 2 cent differential to 40 and above, at $1.10; this posting includes Rodessa, beginning March 16, 1936. It also posted on the same day, Eldorado (East Field), and Smackover.

(Continued on next page)

Manual Promotes Tanker Safety

WASHINGTON—For the use of tankermen as well as of all officers and unlicensed personnel on tankers, the Bureau of Marine Inspection and Navigation has prepared A Manual for the Safe Handling of Inflammable and Combustible Liquids. The information given in the manual is based upon the requirements recently adopted for tanker vessels carrying such cargo. These rules are recommended in the manual also for all tankermen.

A 50-page pocket size booklet, the manual discusses the kinds of oils, characteristics, operations in oil transfer, maintenance of equipment, safety precautions, cleaning, first aid for asphyxiation, and extinguishing oil fires. At the end are 100 questions which might be used for examination of masters, mates, or tankermen.

Both the manual and detailed rules are available at local offices of the Bureau of Marine Inspection and Navigation, or in Washington.

Oil Found in Kenya

LONDON, Jan. 11.—Indications of an oilfield in Kenya, south of Ethiopia, extensive enough to supply the requirements of East Africa, North and South Rhodesia and the Union of South Africa and still leave a considerable surplus for export, have been reported by Jean Dejean, well-known French engineer.

Mr. Dejean has applied to the Kenya government for an exclusive prospecting license for an area of 3300 square miles about 350 miles from the coast. The exact location has not yet been disclosed. Other applications are also being considered by the secretary of state of the colonies, it is understood.

Crude Stocks Rise

WASHINGTON, Jan. 12.—Crude oil stocks increased during the week ended Dec. 26, but indications are that a drop in the week following will more than wipe out the increase since Dec. 5. Crude stocks showed an unbroken decline from June 6 to Dec. 5, then for three weeks the trend turned upward.

(Thousands of Barrels)

Grade of Crude	Dec. 19	Dec. 26	Change
Penna. grade	4,088	3,986	—102
Other Appal.	693	689	— 4
Lima-N. E. Ind.-Mich.	860	839	— 21
Ill.-S. W. Ind.	9,714	9,726	+ 12
N. Louisiana and Ark.	10,553	10,446	—107
W. Tex. and S. E. N. M.	28,399	38,342	— 57
East Texas	19,240	19,195	— 45
Other Mid-Continent	114,610	115,152	+542
Gulf Coast	24,995	24,719	—276
Rocky Mountain	25,718	25,851	+133
California	30,258	30,528	+270
Foreign	2,206	2,144	— 62
Tot. reported weekly	271,334	271,617	+283
Est. of unreported stocks	16,850	16,900	+ 50
Total stocks	288,184	288,517	+333

CRUDE OIL MARKETS

(Continued from preceding page)

North Louisiana-Arkansas—Continued

Ark., $0.75; Effective Jan. 9, 1936, Lockport, La., below 20 gravity, at $0.92, plus 2c differential, to 34 and above, which is $1.22; and for Iowa, La. and Cameron-Meadow field Cameron Parish, La., below 20 at $0.82, plus 2c differential, to 34 and above, at $1.12.

Stanolind Oil & Gas Co., Jan. 20, posted in Caddo Parish, La., below 29 oil at $0.86, plus 2c differential, to 40 and above at $1.10.

Shell Pet. on Jan. 9, posts same schedule in Black Bayou and White Castle, La. as Magnolia posts in Lockport, which see in above paragraph and in Iowa district, La. posts same schedule as Magnolia in Iowa and Cameron, which also see above.

***GULF COASTAL FIELDS**

Posted by Humble Oil & Refining Co.

(Effective Jan. 9, 1936)

Below 18	$0.88	26-26.9	$1.06
18-18.9	0.90	27-27.9	1.08
19-19.9	0.92	28-28.9	1.10
20-20.9	0.94	29-29.9	1.12
21-21.9	0.96	30-30.9	1.14
22-22.9	0.98	31-31.9	1.16
23-23.9	1.00	32-32.9	1.18
24-24.9	1.02	33-33.9	1.20
25-25.9	1.04	34 and above	1.22

(Effective Nov. 1, 1936)

Refugio heavy $0.95

Effective Dec. 1, 1934, Humble prices are based on 99% tank tables at 60F. Allowance or deduction of 1% is made for each 25° change in temperature above or below 60F.

*Includes these fields: Barbers Hill, Goose Creek, Hull, Humble, Liberty, Moss Bluff, Mykawa, Orange, Pierce Junction, Plymouth, Rabbs Ridge, Raccoon Bend (shallow sand), Refugio light, Sour Lake, Spindletop, Sugarland and West Columbia.

Above gravity and crude schedule met Jan. 9 by The Texas Co., except that Texas Co. posts $0.92 for below 20. Jan. 9, Sinclair-Prairie met above Humble schedule in full.

ROCKY MOUNTAIN FIELDS

Posted by Stanolind Oil & Gas Co.

(Effective Jan. 9, 1936)

Salt Creek, Midway and Dutton Creek, Wyo., same schedule as Stanolind posts in Oklahoma, Kansas which see.

Greybull-Torchlight	$1.28
Iles, light, Col.	1.06
Iles, heavy	1.00
Hogback, N. M.	1.21
Big Muddy	1.11

(Effective Nov. 4, 1936)

Grass Creek, heavy	$0.62
Frannie light	0.70
Frannie heavy	0.62
Hamilton Dome, Wyo.	0.57

(Effective July 20, 1936)

Elk Basin, light	$1.18
Grass Creek, light	1.18

Pondera, Mont., (Postings discontinued July 1, 1936, but Stanolind pays price posted by Ohio Oil for Kevin-Sunburst, less 20c per bbl.)

Posted by Ohio Oil Co.

(Effective July 20, 1936)

Elk Basin, Wyo.	$1.18
Grass Creek, light	1.18

(Effective Nov. 1, 1936)

Rock Creek	$1.085

(Effective June 5, 1936)

Sunburst, Mont.	$1.15

Posted by *International Refg. Co.

Cut Bank, Mont.

(Effective June 5, 1936)

Below 35°	$1.29	38-38.9	$1.37
35-35.9	1.31	39-39.9	1.39
36-36.9	1.33	40 and above	1.41
37-37.9	1.35		

*Texas Co. subsidiary.

Posted by Continental Oil Co.

(Effective Jan. 4, 1937)

Cat Creek, Mont.	$1.45

CALIFORNIA, *Posted by Standard Oil of California*

All gravities above those quoted take highest price offered in the field. Prices effective Feb. 26, 1936, except Huntington Beach, Playa del Rey, Santa Fe Springs, Kern Front, Signal Hill (Long Beach) effective March 7, 1936, and Elk Hills, effective June 22, 1936

Gravity	Signal Hill (Long Beach)	Seal Beach	Alamitos Heights	Huntington Beach	Inglewood	Playa de Rey	Olinda Brea Canon	Athens Rosecrans	Domingues	Torrance	Richfield	Whittier East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	‡Newhall and others	Mountain View	Elk Hills	Buena Vista Hills **Midway-Sunset	Lakeview Area	Lost Hills	Coalinga	Wheeler Ridge
14-14.9	$0.80	0.79	0.74	0.78	0.79	0.80	0.76	....	....	0.80	0.76	0.76	0.77	0.78	....	0.70	....	0.70	0.70	0.65	0.70	0.70	....
15-15.9	.80	.79	.74	.78	.79	.80	.76	....	....	.80	.76	.76	.77	.78	....	.70	....	.70	.70	.65	.70	.70	....
16-16.9	.80	.79	.74	.78	.79	.80	.76	....	....	.80	.76	.76	.77	.78	....	.70	....	.70	.70	.65	.70	.70	....
17-17.9	.80	.79	.74	.78	.81	.80	.76	....	....	.80	.76	.76	.77	.78	....	.70	....	.70	.70	.65	.70	.70	....
18-18.9	.80	.79	.74	.78	.84	.80	.78	....	....	.82	.76	.76	.77	.78	....	.70	....	.70	.70	.65	.70	.70	....
19-19.9	.82	.79	.74	.82	.87	.84	.81	....	....	.85	.76	.78	.77	.78	....	.70	.70	.74	.74	.66	.74	.71	.70
20-20.9	.85	.79	.74	.85	.90	.88	.84	....	....	.88	.78	.82	.77	.80	....	....	.70	.78	.78	.68	.78	.72	.70
21-21.9	.88	.79	.74	.89	.93	.93	.88	....	....	.91	.80	.85	.77	.84	.78	....	.73	.82	.82	.71	.82	.74	.70
22-22.9	.92	.82	.74	.92	.96	.98	.92	....	....	.93	.84	.89	.79	.88	.78	....	.77	.87	.87	.74	.86	.78	.72
23-23.9	.95	.86	.77	.96	.99	1.02	.96	.84	.79	.96	.88	.93	.82	.92	.78	....	.80	.92	.92	.77	.90	.82	.76
24-24.9	.99	.91	.90	1.00	1.02	1.06	.99	.88	.81	.99	.91	.96	.85	.96	.82	....	.84	.97	.97	.80	.94	.86	.79
25-25.9	1.03	.95	.82	1.03	1.05	1.11	1.03	.93	.83	1.20	.95	....	.89	.99	.86	....	.88	1.01	1.01	.83	.98	.90	.83
26-26.9	1.06	1.00	.85	1.07	1.09	1.16	1.06	.98	.86	1.05	.98	....	.92	1.03	.90	....	.91	1.06	1.06	.86	1.02	....	....
27-27.9	1.10	1.05	.88	1.11	1.12	....	1.10	1.03	.88	....	1.02	....	.96	1.06	.95	....	.95	1.10	1.10	.88	1.06	....	....
28-28.9	1.14	1.10	.90	1.14	1.15	....	1.14	1.07	.90	....	1.06	....	.99	1.10	.99	....	.99	1.15	1.15	.91	1.10	....	....
29-29.9	1.17	1.15	.93	1.18	1.18		1.17	1.12	.93	....	1.09	....	1.03	1.14	1.03	....	1.02	1.20	1.20	.94	1.14	....	....
30-30.9	1.21	1.19	.95	1.22	1.21		1.21	1.17	.95	....	....	....	1.07	1.17	1.08	....	1.06	1.25	1.25	.97	1.18	....	....
31-31.9				....	1.24		1.24	1.22	.97	....	....	....	1.11	1.21	1.12	....	1.09	1.29	1.29	.99			
32-32.9	*Elwood Terrace			....	1.27		1.27	1.27	1.00	....	....	....	1.14	1.25	1.16	....	1.13	1.34	1.34	1.02	Kettleman Hills		
33-33.9	....	1.28	....	....	....		....	1.32	....	....	....	....	1.18	1.28	1.20	....	1.17	1.38	1.38	1.04	....	1.19	....
34-34.9	....	1.32	....	....	....		....	1.37	....	....	....	....	1.22	1.32	1.25	....	1.20	....	....	....	....	1.23	....
35-35.9	....	1.35	....	....	....		....	1.42	....	....	....	....	1.25	....	1.29	....	....	....	....	....	....	1.27	....
36-36.9	....	1.39	....	....	....		....	1.46	....	....	....	....	1.29	....	1.33	....	....	....	....	....	....	1.31	....
37-37.9	....	1.43	....	....	....		....	1.51	....	....	....	....	1.32	....	1.37	....	....	....	....	....	....	1.35	....
38-38.9	....	....	....	....	....		....	1.56	....	....	....	....	1.36	....	1.42	....	....	....	....	....	....	1.39	....
39-39.9	....	....	....	....	....	F.O.B. Standard Pipe Line	..	1.61	....	....	....	....	1.40	....	....	....	....	....	....	....	....	1.43	....
40-40.9	....	....	....	....	....		....	1.66	....	....	....	....	1.43	....	....	....	....	....	....	....	....	....	....

*F. o. b. ship

‡Also McKittrick, Kern River, Kern Front and Round Mountain $0.70 thru 19.9 gravity; no higher gravity quoted. **Except Lakeview Area.

TRANSACTIONS IN OIL STOCKS ON NEW YORK STOCK EXCHANGE

1935 High	1935 Low	1936 High	1936 Low	Listed Shares	Par Value	Company	Current Dividend	Last Div. Paid	Transactions Week Ended Jan. 9, 1937 Sales Shares	High	Low	Last	Week's Change
80	48¼	125½	75	788,675	N.P.	Amerada Corp.	50cQ	Oct. 31, 36	13,200	110⅞	101	108	+ 7
44	29½	51½	36	2,290,412	$25	Associated Oil Co	25c	May 1, 36	.....	.....	.....	.....	.....
28	20½	35⅛	26⅝	2,664,901	25	Atlantic Refining Co.	50c	Dec. 15, 36	25,300	32⅜	30⅛	31⅞	+ ⅝
.....	.....	118½	109	.....	....	do pfd A	....	.....	.....	.....	.....	.....	.....
14¾	5⅞	28¼	14⅛	2,247,974	5	Barnsdall Corp.	20c	Nov. 2, 36	94,800	30½	26⅛	30¼	+ 2⅞
9⅞	6¾	30	8½	1,444,970	N.P.	Colonial Beacon Oil Co.	....	.....	.....	.....	.....	.....	.....
12¼	6¼	17¼	11⅛	13,983,287	N.P.	Consolidated Oil Corp.	40c	Nov. 16, 36	145,400	17¼	16	16⅞	+ ¼
112½	108½	106⅛	101	132,771	$100	do pfd	$1.25Q	Dec. 1, 36	.....	.....	.....	.....	.....
35	15⅛	44⅞	28⅛	4,682,662	5	Continental Oil Co.	25c	Dec. 15, 36	30,500	45¼	42¼	45	+ 2
22½	11⅝	34⅝	21¼	413,333	$10	General Asphalt Co.	....	.....	.....	.....	.....	.....	.....
7	1½	13⅞	6⅜	1,098,618	25	Houston Oil Co. v.t.c.	....	.....	88,000	14½	12½	14½	+ 1⅞
5¼	2⅛	15⅛	4⅛	1,207,132	10	Indian Refining Co.	....	.....	1,600	13¼	12¾	13	0
1⅞	⅝	.....	....	1,309,060	N.P.	Louisiana Oil Ref'g. Corp.	....	.....	.....	.....	.....	.....	.....
15	4½	51½	13	40,000	$100	do pfd	....	.....	550	29⅞	28⅜	29	+ ¾
3	1	6¾	2¼	330,000	N.P.	Maracaibo Oil Exploration Co.	....	.....	4,800	5⅛	4¾	4⅞	+ ⅛
20⅛	9⅛	30⅞	17¼	1,855,912	$10	Mid-Continent Pet. Corp.	75c	Dec. 1, 36	16,500	31⅝	29¼	30¾	+ ¾
17¾	10⅜	29⅞	16¾	1,399,345	N.P.	Mission Corp.	45c	Dec. 18, 36	4,300	29	27⅝	27⅝	— 1⅜
14¼	9¼	18	12¼	6,563,377	N.P.	Ohio Oil Co.	35c	Dec. 15, 36	107,200	18⅞	17⅛	18⅝	+ 1⅛
21	10¾	20⅝	12¼	4,699,885	$5	Pan Amer. Pet. & Transp. Co.	60c	Dec. 21, 36	300	17	16	17	— ⅞
1⅞	⅛	4¼	1⅜	199,370	N.P.	Panhandle Prod. & Ref'g. Co.	....	.....	1,100	3⅛	3	3⅛	+ ⅛
20	6½	74½	18⅛	17,994	$100	do pfd	....	.....	70	60½	60	60	— ¼
14	7⅝	18¼	12⅜	2,153,444	5	Petroleum Corp. of America	25c	Sept. 30, 36	22,500	18½	17¼	18¼	+ ⅜
40	13⅜	52⅜	38⅛	4,152,836	N.P.	Phillips Petroleum Co.	$1.00C	Dec. 1, 36	25,200	52½	49½	51⅝	+ ⅝
1¼	¼	2¼	⅞	1,184,817	$25	Pierce Oil Corp.	....	.....	.....	.....	.....	.....	.....
8	2⅜	18¼	8	150,000	100	do pfd	....	.....	7,600	17⅝	16⅜	17½	+ ¼
1¾	⅝	3⅝	1⅛	2,500,000	N.P.	Pierce Petroleum Corp.	....	.....	32,100	3⅝	3⅛	3½	+ ⅛
13	6⅛	27⅜	11⅞	1,050,000	$5	Plymouth Oil	25cQ	Sept. 30, 36	15,800	26⅞	25⅜	26	— ⅛
17	5⅞	24⅞	16	3,038,370	N.P.	Pure Oil Co.	.....	.....	160,900	22⅞	19¾	22	+ 1½
103	34¾	118	91¼	167,640	100	do 6% pfd	$1.50	Jan. 1, 37	1,300	102	99	101⅝	+ 2⅝
119⅞	49¾	133¾	103	130,000	100	do 8% pfd	$2.00	Jan. 1, 37	250	111¼	108	110	— 1⅛
48⅝	29⅛	57⅝	48⅜	425,342	a	Royal Dutch Co. (N. Y. shares)	$1.70	Aug. 1, 35	.....	.....	.....	.....	.....
36⅞	20¾	44	30½	1,244,383	N.P.	Seaboard Oil of Del.	25c	Dec. 15, 36	21,000	43	41⅜	42	— ⅛
39	20⅝	48	38½	56,148	£2	Shell Transport & Trading Co.	$1.237	July 24, 35	.....	.....	.....	.....	.....
16⅛	5⅛	28¼	14¾	13,070,625	N.P.	Shell Union Oil Corp.	25c	Dec. 15, 36	31,500	29¾	27½	29	+ ¾
111	63⅛	127⅛	102	400,000	$100	do pfd. w w.	$26.125	Dec. 15, 36	6,200	103⅛	102¼	103⅛	+ ⅛
18¾	4¾	6¾	3⅛	461,000	10	Simms Petroleum Co.	**$1.00	Jan. 9, 37	3,900	3⅞	3½	3¾	+ ⅛
20½	6⅛	47⅜	19½	1,008,549	15	Skelly Oil Co.	.....	.....	8,700	47	44¼	44¼	— 2¼
116¼	60	132	97⅝	120,000	100	do pfd	$25.50	Dec. 21, 36	500	100	99	100	+ ¾
15¾	10⅝	17½	12½	31,151,075	15	Socony Vacuum Oil Co.	25c	Dec. 15, 36	98,500	17⅛	16⅛	16⅞	— ⅛
116	111	113½	109‡‡	764,925	100	S. O. Export Corp. pfd.	$2.50 S.A.	June 30, 36	.....	.....	.....	.....	.....
41⅛	27¾	47⅝	35	13,014,754	N.P.	S. O. California	30c	Dec. 15, 36	41,000	45¼	43½	44⅞	+ ⅞
33⅝	23	48½	32¾	15,215,677	$25	S. O. Indiana	$1.25	Dec. 15, 36	18,333	48	46½	46⅝	— 1⅜
32	20	31	25	145,441	10	S. O. Kansas	$1.00	Dec. 26, 36	.....	.....	.....	.....	.....
52⅝	35¾	70⅝	51⅛	26,200,825	25	S. O. New Jersey	$1.25	Dec. 15, 36	44,200	69	67¾	68½	0
77	60⅛	91	70	2,019,093	N.P.	Sun Oil Co.	25cQE	Dec. 15, 36	1,600	77	74⅜	77	+ 3
121	115½	125	118	100,000	$100	do pfd	$1.50Q	Dec. 1, 36	80	125	124	124	0
3⅛	1⅝	6¾	3	966,979	$1	Superior Oil Corp. (Del.)	....	.....	47,000	5½	4⅝	5⅛	+ ¾
30¼	16½	55¼	28⅞	9,851,236	$25	The Texas Corp.	25c	Jan. 1, 37	41,600	54¾	52⅝	54¾	+ ⅞
9¼	3¼	15¼	7⅛	930,570	10	Texas Pacific Coal & Oil Co	25c	Aug. 1, 36	59,000	14⅞	13⅛	14⅞	+ 1⅜
15⅞	7⅜	21⅜	14⅜	5,998,919	N.P.	Tide Water Associated Oil Co.	15c	Dec. 1, 36	12,400	21⅜	20⅝	21	+ ⅛
104½	84	106½	100⅝	695,503	$100	do pfd. C. T. V.	$1.50	Jan. 2, 37	5,100	106½	105⅛	106⅛	+ ⅛
48	26¾	60	51	2,191,823	N.P.	Tide Water Oil Co.	70c	Nov. 17, 36	.....	.....	.....	.....	.....
24	14¾	28¼	20⅜	4,386,070	$25	Union Oil of California	25cQ	Nov. 10, 36	14,000	26⅛	25¼	25¾	+ ¼
26½	20¼	31⅝	22⅝	1,200,000	N.P.	Union Tank Car Co.	30cQ	Dec 1, 36	8,600	29½	26⅝	29	+ 2¼
1⅝	⅝	2⅞	½	759,538	N.P.	Warner Quinlan Co.	....	.....	6,200	1⅜	1⅛	1¼	0
3½	1	5¼	2¼	431,443	$5	H. F. Wilcox Oil & Gas Co.	....	.....	21,200	5¼	4½	4⅝	+ ¼

*New high. †New low. Ex-div. **Dividends of liquidation. ‡ Stock dividend. a Par 33 1/3 florins
C Unclassified. E also 6% stock dividend.

STANDARD OIL STOCKS ON NEW YORK CURB MARKET

1935 High	1935 Low	1936 High	1936 Low	Listed Shares	Par Value	Company	Current Dividend	Last Div. Paid	Transactions Week Ended Jan. 9, 1937 Sales Shares	High	Low	Last	Week's Change
16	6	18	12¼	36,000	$25	Borne Scrymser Co	75c	Oct. 15, 36	250	16¾	15¼	16¾	+ 1⅜
42½	30½	50	39¾	200,000	50	Buckeye Pipe Line Co.	$1.00	Dec. 15, 36	100	47	46¾	47	— ¾
157	115	124¾	105	120,000	25	Chesebrough Mfg. Co	$1.50	Sept. 30, 36	100	113	110¼	113	+ 3
23¾	10	39	19⅞	6,974,356	$5	Creole Petroleum Co	25c	July 15, 36	8,700	37¾	35¼	36⅛	— ⅝
38	33¼	47½	38½	50,000	$50	Eureka Pipe Line Co.	$1Q	Nov. 2, 36	.....	.....	.....	.....	.....
64	44	80	57	8,985,662	N.P.	Humble Oil & Refg. Co.	50c	Dec. 26, 36	7,100	81½	77½	79⅞	+ 1⅜
22½	15⅝	24½	19¾	26,965,078	N.P.	Imperial Oil Ltd.	°25cS.	Dec. 1, 36	14,500	22	21	21½	+ ½
22½	15⅞	24⅜	19⅞	.....	N.P.	do registered	25cQ	Dec. 1, 36	.....	.....	.....	.....	.....
6⅛	3⅝	9¾	5½	300,000	$10	Indiana Pipe Line Co.	20c	Dec. 17, 36	1,200	8⅜	7¾	8⅛	+ ⅜
39¾	28	39⅜	32⅝	14,324,088	N.P.	International Pet. Co.	°75cS.	June 1, 36	9,200	36	33¾	35⅝	+ 1⅜
.....	.....	38½	33⅜	.....	.....	do registered	.....	.....	.....	.....	.....	.....	.....
10⅜	6¾	15⅔	9¼	509,000	$12.50	National Transit Co.	40c	June 15, 36	1,500	10½	10⅛	10½	0
4⅞	3	6¼	4¼	100,000	5	New York Transit Co.	15c S.A.	Apr. 15, 36	.....	.....	.....	.....	.....
8	5¼	9¾	4⅞	120,000	10	Northern Pipe Line Co.	35c	Jan. 2, 37	.....	.....	.....	.....	.....
107¼	90¼	110¾	104½	562,122	100	Ohio Oil Co. pfd.	$1 50Q	Dec. 15, 36	900	110½	109¾	110½	+ ¾
11	5½	8¼	5½	400,000	25	Penn Mex Fuel Co.	....	Dec. 22, 33	100	6	6	6	+ ½
34½	21⅝	44	32½	1,142,671	25	South Penn Oil Co.	90c	Dec. 29, 36	2,700	46	44	45¾	+ 2
5	3⅞	7⅞	3¼	100,000	10	Southern Pipe Line Co	10c	Sept. 1, 36	2,100	6⅝	5	6⅝	+ 1⅛
56	45¼	60	44	35,000	50	South West Pa. Pipe Lines	$1.00	Oct. 1, 36	.....	.....	.....	.....	.....
24	18	23⅝	17½	2,604,801	10	S. O. Kentucky	35c	Sept. 15, 36	3,900	20¼	19⅜	20¼	+ ⅞
12	7¾	14⅜	11	182,803	25	S. O. Nebraska	....	June 20, 34	900	12¼	11½	12¼	+ ½
23⅜	11½	40	21¾	753,740	25	S. O. Ohio	$1.50	Dec. 21, 36	2,700	37¾	36¾	37	— ¼
99½	89	107½	97	120,000	100	do 5% pfd.	$1.25Q	Oct. 15, 36	.....	.....	.....	.....	.....
6	2¼	13¾	5⅛	34,158	15	Swan Finch Oil Corp.	.....	.....	200	13¾	13½	13½	— ¼

*New high †New low. °Imperial Oil Spec. 37½c Dec. 1, 36. International Pet. Spec. 50c June 1, 36.
x Ex dividend

Oil and Royalty Stocks on New York Curb

1935 High	1935 Low	1936 High	1936 Low	Par Value	Company	Transactions Week Ended Jan. 9, 1937 Sales Shares	High	Low	Last	Week's Change
⅜	⅛	1⅞	⅞	N.P.	American Maracaibo	24,100	1⅜	1¼	1⅜	0
3⅛	⅛	8¼	3¼	N.P.	Arkansas Nat. Gas	15,000	8⅝	7¾	8⅛	+ ¼
3⅜	⅛	8⅜	3¼	N.P.	do A	61,700	8⅝	7⅞	8⅜	+ ⅛
7⅛	2¼	10⅞	7⅛	$10	do pfd	4,300	10⅜	9⅞	10	— ¼
16¾	14½	27¼	16½	N.P.	British Amer. Oil coup.	200	23¾	23¼	23¾	+ 1½
...	...	26¾	21¾	N.P.	do registered	...	...	...	...	...
4½	1⅛	4⅞	1⅞	$¼	Carib Syndicate	14,000	2½	2¼	2⅜	0
3¼	⅜	7⅛	3	N.P.	Cities Service	129,500	4⅝	4⅛	4⅝	+ ⅜
47¼	6⅛	66	41⅛	$100	do pfd	6,700	60	56	58½	+ ½
4⅜	⅜	6½	3¾	10	do pfd. B	700	5⅞	5½	5⅝	+ ¼
43	6	63	40	100	do pfd. BB	40	58	56½	58	— 1
2⅛	⅛	4	⅜	N.P.	Colon Oil Corp.	...	...	...	...	...
1⅛	⅛	10½	¼	N.P.	Columbia Oil & Gas vtc.	75,400	10⅞	8¾	10½	+ 1¼
3	1	5	2	$1	Consolidated Royalty	...	...	...	...	...
1⅛	¼	4⅝	1½	N.P.	Cosden Oil	41,400	4½	3⅝	4	— ½
6¼	¾	38½	6½	$100	do pfd	2,400	38	33½	34⅝	— 4⅛
2⅛	⅜	2¾	1¾	N.P.	Crown Central Pet.	17,900	2¼	2	2¼	+ ⅛
8⅞	4	18⅛	9	N.P.	Darby Petroleum	2,300	17⅝	16⅞	17	— ⅜
2	¾	6¾	1⅞	N.P.	Derby Oil & Refg.	3,300	6⅛	5¼	6⅛	+ ⅜
20	20	81	25½	N.P.	do pfd	475	82	76½	80⅞	+ 5⅞
74¾	50¼	59	54	$25	Gulf Oil Corp.	36,600	62⅞	58	61⅝	+ 3⅝
4¼	1½	6¼	2⅝	N.P.	Indian Ter. Illg. Oil A	1,400	4½	3¾	4½	+ ½
4¼	1½	6½	3	N.P.	do B	2,300	4½	3⅞	4½	+ ⅝
3	1⅞	5¾	2⅜	N.P.	Kirby Petroleum	16,200	6⅞	5¼	6⅝	+ 1½
¾	¼	2	½	$25	Leonard Oil Dev.	14,300	1⅛	⅞	1	0
8¼	3½	17¾	7⅝	N.P.	Lion Oil Refg.	14,500	17¾	16⅜	17⅝	+ 1½
10⅞	4½	14¼	9⅛	N.P.	Lone Star Gas	7,200	12½	11¾	12½	+ ⅝
19	4	22¼	12	N.P.	Margay Oil Co.	1,200	20	17	20	+ 2¼
2⅝	⅞	4⅛	1⅛	N.P.	Mexico-Ohio Oil	7,500	4⅛	3¾	4	0
3⅝	1⅞	4¾	1⅞	N.P.	Michigan Gas & Oil	600	3	2⅞	3	0
3⅞	⅞	6⅝	2¾	N.P.	Mid. States Pet. A vtc.	2,400	6⅜	5⅝	6¼	+ ¼
⅛	¼	2⅛	⅛	N.P.	do B vtc.	3,100	1⅞	1⅝	1¾	0
½	¼	⅛	¼	$1	Mountain & Gulf	...	...	...	...	...
5¼	4⅛	5⅜	5	10	Mountain Producers	3,800	6⅜	6	6⅜	+ ⅛
20	11¾	23	17⅝	N.P.	National Fuel Gas	3,700	18¼	17½	17⅞	+ ⅛
3¼	2	4⅝	2⅞	$5	New Bradford Oil	500	5	4¾	5	+ ⅜
4	2	8⅜	3⅝	N.P.	North Central Texas	...	...	...	...	...
⅛	⅛	⅛	⅛	N.P.	North European	7,300	⅛	⅛	⅛	0
12¼	9⅝	17⅝	12	N.P.	Oil Stocks Ltd. A	...	...	...	...	...
4⅜	1¼	10⅛	3¼	N.P.	Pantepec of Venezuela	127,200	9½	8¼	8¼	— 1⅜
⅜	⅛	1	⅛	N.P.	Producers Royalty	...	...	...	...	...
3¾	⅛	20	3	N.P.	Red Bank Oil	2,300	11¾	10½	11	+ ¼
½	⅛	1½	⅛	N.P.	Reiter-Foster Oil	1,200	⅜	¾	⅜	+ ⅛
2⅞	⅛	2¾	¼	$25	Richfield Oil pfd	...	...	...	...	...
5	1½	19¼	4½	$1	Root Petroleum	2,000	13¾	13	13¼	— ½
15⅛	8	23	14½	20	do conv. pr. pfd.	300	18	17½	17½	— ¼
...	...	39	26¾	$10	Royalty Corp. pfd.	...	...	...	...	...
2⅛	⅝	4¾	1⅞	N.P.	Ryan Consolidated	5,700	5⅛	4¼	4⅞	+ ⅛
1	⅛	2⅛	½	$10	Salt Creek Consolidated	...	...	...	...	...
7⅛	5⅛	10	5¾	10	Salt Creek Prod.	...	...	...	...	...
6⅞	4⅝	11¼	6¼	N.P.	Southland Royalty	4,100	9½	9	9½	0
2⅞	⅞	5	2⅜	$5	Sunray Oil	23,600	4½	4	4½	+ ⅜
...	...	49	45	...	do pfd	400	48	45¼	48	+ 3
4	2	6⅞	4¼	$1	Swiss Oil Corp.	...	...	...	...	...
6⅞	5	9¾	5⅜	N.P.	Texon Oil & Land	4,900	6⅞	6⅛	6¾	+ ⅜
...	...	8	2⅛	.	Venezuela Mex.	3,800	8	7¼	7¾	+ ¼
2¼	⅛	3	1¼	$1	Venezuela Petroleum	10,000	2	1¾	1⅞	0
6¼	3½	11	5¾	$1	Woodley Petroleum	1,000	9	8¾	8¾	— ¼

*New high. †New low.

New York Bonds

Week Ending Jan. 9

	High	Low	Last	Change
Atlantic Refg. deb. 5s	102	102	102	— ⅛
Houston Oil 5⅛s '40	103¼	102¼	103	+ ⅜
Pan Amer. Pet. of Calif. 6s	58	54¼	57½	+1½
do 6s ctfs	57⅝	54	56	+ ⅞
Pure Oil 4¼s '50 w.w.	127⅝	120	125¼	+4¼
Pure Oil 4⅛s '50 x.w.	105	104¼	104¾	+ ⅛
Richfield Oil of Calif. 6s	66	62¼	64¼	+1¼
do 6s ctfs	66	62¼	64¼	+1⅛
Shell Union Oil 3½s '51	102	101¼	102	+ ½
Skelly Oil 4s '51	102¾	101¾	102¼	— ¼
Socony-Vacuum 3½s '50	107⅛	106¾	107⅛	+ ⅜
S. O. N. J. 3s '61	102	101½	101¾	— ¼
Union Oil of Calif. 6s A	121⅞	121	121⅞	+ ⅞
do 4s '47	108	103¼	103⅝	—4⅝
Warner-Quinlan 6s '39	54¼	52	53½	+1¾

Oil Dividends

Dividends Waiting Payment

Company	Amount		Payable	
Amerada q	50c	Jan. 15	Jan.	30
Atlantic Refg. pfd. q	$1.00	Jan. 5	Feb.	1
Barnsdall Oil*	25c	Jan. 14	Feb.	1
Consolidated Oil q	20c	Jan. 15	Feb.	15
Darby Petroleum s	25c	Jan. 4	Jan.	15
Eureka Pipe Line q	$1.00	Jan. 15	Feb.	1
McColl Frontenac pfd. q.	$1.50	Dec. 31	Jan.	15
Root Petroleum q	25c	Jan. 18	Feb.	1
Royal Dutch Pet. Co	5%	.....	Jan.	14
Shell Trans & Trading	7½%	.....	.....	
do	stk.**	.....	.....	
Skelly Oil 6% pfd. q	$1.50	Jan. 5	Feb.	1
Standard of Ohio pfd. q.	$1.25	Dec. 31	Jan.	15

*Paid 20c Nov. 2, last.
**Gives one share for five.

Pittsburgh Stock Exchange

Transactions Week Ended Jan. 8, 1937

	Sales	High	Low	Last	Change Over Week
Ark. Nat. Gas	200	8¼	7⅝	8⅛	+ ⅛
do pfd	240	10⅛	10⅛	10⅛	— ⅛
†Cities Serv	417	4⅛	3⅞	4⅜	+ ⅜
Col. Gas & Elec	1,427	19⅜	18⅛	19½	+1⅜
†Col. Oil & Gaso.	450	10½	8⅞	10½	+ ⅞
Lone Star Gas	4,793	12¼	11¾	12¼	+ ¼
Mountain Fuel Supply	20,996	10¼	7⅜	10¼	+2⅛
Phoenix Oil	10,880	.10	.07	.08	+.04
do pfd	500	.09	.09	.09	0
Plymouth Oil	379	26⅞	26	26⅞	— ⅛
Shamrock Oil & Gas	17,491	7⅛	6⅛	7	+ ⅛
do pfd	715	14½	14	14½	+ ½
†Stand. Oil of N. J.	386	69	67⅞	68½	— ⅝

†Unlisted.

New York Curb Bonds

Week Ending Jan. 9

	High	Low	Last	Change
Cities Serv. 5s '66	82	77¾	81¾	+1¾
Cities Serv. 5s '50	83	78½	82	+2½
Cities Serv. G. 5½s '42	102¼	102¼	102½	+ ¼
Empire O & R 5½s '42	93½	92¾	93	+ ¼
Valvoline Oil 7s '37	100	100	100	+1

Cleveland Stock Exchange

Transactions Week Ended Jan. 9, 1937

	Sales	High	Low	Last	Change Over Week
Canfield Oil	....	....	....	....	....
do pfd	....	....	....	....	....
Nat'l Refining	348	8⅞	8½	8½	+ ¼
do pfd	15	95	95	95	—3

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Automotive NOTES AND COMMENTS

By JOHN W. THOMPSON
N. P. N. Staff Writer

THE recent press rumblings about the Pogue carburetor, the invention of a Canadian engineer, who claims that it has made possible a fuel mileage of 216 per Imperial gallon, caused considerable stir at the time.

And when you consider that 25 miles per Imperial gallon is a good average mileage for a low-priced American car, you can see that such news when splashed on the front pages must have carried a jolt big enough to unmount many a Canadian Mounted. Oil company stocks were said to have dropped on the Toronto Exchange, and things like that.

The invention seems to have been given slight serious attention in this country, with most of the "bigwigs" believing it to be a good laboratory stunt to show to visiting scientists, but impractical for you and you and you and me.

However, a few got up out of their rocking chairs and quietly went back to have another look after the "company" left. They saw in this carburetor a big forward step in the continual effort to get more than the present disgracefully small bit of energy out of a gallon of gasoline. And so, if they should sell stock, this writer will probably rush to make a purchase, to re-confirm his faith in mankind, inventors, and carburetors. As Americans, we believe that a thing must be right, or they wouldn't sell stock in it.

* * *

Charles F. Kettering, who is to General Motors what liver is to bacon and what black is to blue, is of the opinion that air conditioned automobiles are still in the elusive stage. Cost and weight seem to be the toe-stubbers. Kettering says about two horsepower would be necessary to do the work with such a unit, and that it should be removable, with a separate engine driving the compressor.

Such a unit would weigh about 400 pounds, and according to Kettering, would cost about as much as a new small car. So it looks as though, for the present at least, you will have to be content with just the heater and the radio getting out of order.

* * *

The car manufacturers would have you know that it costs real money to put on the extra doodads that make every automobile the finest in its field, the lowest on fuel consumption, the outstanding value in power and get-away, and other things which only a demonstration will prove to you.

For example, Buick spent over $300,000 for gear cutting equipment and testing devices to produce hypoid gear sets for its 1937 models.

The four jack pads which facilitate tire changing, will add more than $150,000 to the factory cost of producing the 1937 Pontiacs.

The coil spring which makes the Pontiac gasoline tank theft-proof is only a 12-cent individual item, but it adds $30,000 to the production cost. Extra headlight fuses at 9 cents each add $22,000. Valve spring dampeners cost Pontiac another $300,000.

* * *

Calcium chloride, a chemical that has become popular on municipal and state highways as an ice and snow melter and which does such a beautiful job of destroying the enamel finish on auto fenders and other sheet metal parts, has met its equal. A rubber paint has been developed which can be sprayed or brushed onto the undersides of fenders and aprons, filling the pores of the finish and providing a surface which this chemical will not attack.

It also seals filler strips, where the calcium chloride usually does its worst damage.

Of course, one must not forget the experimentation that is going on with the metal surfaced street which is equipped with a heating unit that is turned on tc melt the ice and snow when the going gets a bit slippery.

Such a development would make it tough on the calcium-chloride-for-street-snow-melting boys and the rubber-paint-for-fender-enamel-protection-boys. But then, look at the horse car. If you can't find a horse car to look at, then look at a picture or a reasonable facsimile of one.

* * *

It is, of course, not new to you that Henry Ford brought his 8200 dealers into Detroit Nov. 6, the first time he had ever done such a trick, to witness the unveiling of his new idea in motordom—or at least in Ford motordom. It was on that day he introduced the car with "two pairs of pants", that is, with two engines. While that event happened some time ago, it was not until recently that figures were made available on what it took to furnish lunch and dinner to the 8200 visiting firemen. So raise the eyebrows and open the mouth in astonishment while you read:

14	truckloads of silverware and dishes
650	waiters, 50 cooks, 12 bakers and 100 helpers
2½	miles of tablecloths
56,000	pieces of silverware
5,000	pounds of lobster
4,000	chickens
120	gallons of chow mein
8,000	pies
2,000	quarts of ice cream
2	tons of potatoes
1,500	gallons of soup
1,000	pounds of butter
50,000	rolls
50	gallons each of olives and sweet pickles
10,000	quarts of coffee

That reminds me; I must get a half-pound of chipped beef on the way home tonight.

In a recent broadcast, General Motors recalled the days of the early motor car, when it was called a "pleasure vehicle". Between concertos in A minor, we were reminded that, years ago, with the first early frost of winter, the car was run in the barn, stripped of gas, water, and tires, and set up on wooden horses to await the coming of warmer days. The oil was drained, the exposed mechanism was smeared with grease to ward off rust, and then the whole car was covered with a huge cloth like a ghost of departed joys".

It is a pleasant feeling to recall old days. It makes you appreciate the present. Rather like the enjoyment that comes with repeatedly hitting your finger with a hammer; it feels so good when you quit.

* * *

That peculiar species of human who, when he buys a car that doesn't live up to the claims that he paid for, paints those lemony lemons on the body to let the public know its a louzy car, will find his style somewhat cramped in Washington.

The practice, a sort of publicized pictorial raspberry or Bronx cheer for the car, has been made unlawful in the national capital, punishable by a fine ranging up to $300. According to the law, no person shall have a car in public view painted or otherwise adorned in such a manner as to cast reflection, scornful derision or ridicule upon any make or type of vehicle.

Henceforth, in Washington the painting of the lemon upon the car must necessarily be transferred to the garage walls.

* * *

Within 10 years power alcohol will become an economic force in American agriculture. That was the prediction passed around recently by Dr. Leo M. Christensen and Dr. Harry Miller, at Atchison, Kansas, following three months of commercial production on a restricted research basis of anhydrous alcohol made from a wide variety of farm products, of which grain sorghum, oats and barley proved one of the best combinations.

Laboratory experimentation has indicated to these men, they claim, that anhydrous alcohol could be blended up to 20 per cent with gasoline to serve as a successful fuel for high compression combustion engines.

Four states are selling this alcohol blend gasoline at service stations at the price of regular gasoline—Iowa, Kansas, South Dakota, and Nebraska, according to the report.

You can submerge a rubber ball in water by holding it there, but as soon as you let go for an instant, up it bobs again. So it goes with alky-gas.

* * *

The energy contained in the gasoline consumed in the U. S. each year is greater than 15 Niagara Falls. Gee!

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Lubricating

THE 1937

More Cars Using Hypoids; Alligator-Type Hoods Make Engine Points More Difficult To Reach; Battery Under Hood On Four Cars.

FROM a lubrication standpoint, probably the outstanding development on the 1937 cars is the hypoid rear axle. Whether or not the hypoid is here to stay is a question only time will tell. The fact remains, however, that hypoids are used on 21 models of the 1937 makes of cars, while last year only 13 models used this type of axle.

The hypoid rear axle came into use on passenger cars as a means of eliminating the objectionable floor tunnel. The design permits dropping the propeller shaft down so that it clears the rear floor. Other advantages claimed for the hypoid axle are greater gear tooth strength and greater axle quietness.

The hypoid invades the low priced field for 1937, being used on Chevrolet and Plymouth. Dodge adopted the hypoid axle in the summer of 1936.

Due to the fact that hypoids are sensitive to lubrication, Packard, Studebaker, Cadillac, La Salle, and Chevrolet have believed it a wise procedure to direct the car owner to the car dealer to insure his getting a lubricant that is factory approved.

Chevrolet, Cadillac, and La Salle are supplying their dealers with General Motors branded hypoid lubricants and grease guns. However, tests of commercially branded hypoid lubricants are being made by General Motors and Chevrolet has now approved quite a lengthy list as satisfactory. Packard is also following this procedure of approving a branded lubricant only after extensive tests. It is expected that Studebaker, which recommends a Studebaker hypoid lubricant for its rear axles, will issue no approved list of branded products for 3 or 4 months, at least.

Buick, originally specifying a mild extreme pressure lubricant for its hypoids, is now specifying a hypoid lubricant. Oldsmobile, although using a spiral bevel rear axle, is recommending a hypoid lubricant because of its axle's high tooth pressures. Both Buick and Oldsmobile are leaning quite heavily on the Chevrolet servicing requirements for lubrication of their hypoids.

With Ford, Willys, Studebaker, Chrysler, DeSoto, Lincoln-Zephyr, and Cord equipped with hoods that hinge at the rear and lift from the front, it is probably already evident to many station attendants who have serviced 1937 cars that they must add the contortionist's art to their many other qualifications.

BATTERY manufacturers have been working for years in an effort to get the car makers to locate the battery under the hood where it will stand more of a chance of getting its deserved two-week servicing. Willys, Ford, Hudson, and Terraplane have weakened, so that, when you service the battery on these cars, you now simply lift the hood instead of tearing up the carpet and floor boards.

Crankcase oil specifications show little change from last year, with light oils still getting the call in the majority of cases. Chevrolet, instead of specifying a certain viscosity between certain temperature limits, now shows on a thermometer in the instruction book the lowest temperature at which indicated grades of oil will permit easy starting.

Incidentally, gasoline, water, and oil servicing is done from the right hand side of the 1937 Chevrolets.

Studebaker, with its new Fram oil filter, recommends that oil be changed only summer and winter, provided the filter cartridge is changed whenever the oil shows dirty on the dip-stick. Buick clings

Why a Car Needs Lubrication

Here are some things to think about while lubricating an automobile. The figures were taken from the publication, "The Delaware Motorist", and show that, when an automobile has traveled 1000 miles, its moving parts have performed about like this:

- The crankshaft has made 3,000,000 revolutions.
- The camshaft has revolved 1,500,000 times.
- Each valve has opened and closed 1,500,000 times.
- The pistons have traveled 1420 miles.
- The distributor shaft has completed 1,500,000 revolutions.
- Breaker points have opened and closed 9,000,000 times.
- Transmission, rear axle pinion, and universals have revolved 3,000,000 times.
- Rear axle and tires have made 7,500,000 revolutions.

These figures should help you to sell your customers on the need for lubrication service at regular intervals.

By JOHN W. THOMPSON
N. P. N. Staff Writer

AUTOMOBILES

Appeal to New Car Owners

Under the title "The Hufflewaite Boys Go After The New Car Business" the Shell Union Oil Corp., in the December issue of Shell Progress, points out some of the profit possibilities in pitching to new car owners:

"When the new cars come out we keep a scrap book of all the pictures and write-ups so that when a 1937 turns into the driveway we can name it before it stops, and talk with the owner about the good points that made him buy it."

"Never yet saw a new-car owner this didn't please."

"Folks develop an affection for their old cars—but they are as proud of a 1937 model as of a new son and heir. We Hufflewaites treat automobiles the way a trainer does a racehorse. And we let customers know that's the way we feel about it."

"Extra service just comes natural on the 1937 models and it makes friends aplenty. We wipe even the steering wheel and the running board of a new car—all the while telling the customer about our cleaning service to keep it looking shipshape and our new Shellubrication methods to keep the motor young and the chassis spry."

"If a man buys a 1937 model in the winter time, it's a sure guess he won't send it to dead storage. So when Sam goes to call on new owners he takes along a few road maps and explains Shell's touring service."

"Lots of chauffeur-driven cars are being traded in for new models about now. Some of them will start south right after Christmas, so we contact the drivers as soon as we get the tip on the sale. We know they'll be back in these parts again when the birds start to fly north next spring."

to its oil change recommendation of last year, specifying a drain every three months. Chevrolet does not designate any definite period for changing oil, stating this should be determined by the mechanical condition of the car and the care it receives.

Hupmobile, Reo and Auburn are not represented in the 1937 car field. Hupmobile has not been able to get its financial position secured to the point of attempting new models. Reo announced a short time ago it would withdraw from the passenger car field and center its activities on trucks. Auburn will not introduce its 1937 car until sometime in March. Auburn's front wheel drive Cord for 1937 remains unchanged from a lubrication standpoint. A supercharged Cord is new this year, however, developing 170 horsepower.

Individual front wheel suspension continues, with few exceptions, on the same models as last year. Chevrolet again offers an enclosed knee action on its deluxe model, and conventional springs on the standard model. Pontiac, which followed a similar practice last year, has discontinued the use of conventional springing on the front of its standard model, so that now all Pontiacs have adopted the open type individual springing on the front wheels. Pontiac formerly used the enclosed, or Dubonnet, type of knee action.

Hudson and Terraplane, who last year introduced torque arms which pivoted to the frame and which controlled the movement of the front axle, continue with that design this year, except that the arms are no longer pinned to the front axle but are connected solidly by means of a forging.

Packard's individual front wheel suspension system, known as Safe-T-flex and introduced on the "120" model last year, has been adopted on all Packard models for 1937.

A new type of rubber insulated universal joint is used on the new Studebaker Dictator model, eliminating the need for lubrication at this point. The spline on the Dictator propeller shaft has also been eliminated.

On the 1937 cars, the transmission overdrive is continued as standard equipment on the Chrysler Airflow, Pierce Arrow, and Cord, and as optional equipment on the Chrysler 6 and 8, DeSoto, Graham, Nash-LaFayette, and Studebaker. The electric hand gear shift mechanism is continued as optional on Hudson and Terraplane, and standard on the Cord.

Hydraulic brakes are used on all the 1937 cars, with the exception of Ford, Lincoln-Zephyr, Lincoln, Pierce Arrow, and Willys. Booster attachments are used on the hydraulic braking systems of the Cadillac V-16, Chrysler Airflow and Custom Imperial and the Packard 12.

On the pages immediately following are some of the important points on lubrication, including the changes, on the 1937 cars. Station attendants can use these pages as a ready reference in finding out how the 1937 models differ from those brought out for 1936.

The alligator-type hood, as shown here on the Chrysler Six, is also used by Ford, Willys, Studebaker, DeSoto, Lincoln-Zephyr, and Cord for 1937

BUICK

Hypoid Axle Adopted on Two Models

Buick 1937 models bear the same series numbers as last year, namely 40, 60, 80 and 90, but the wheelbases have been increased on the series 40 and 60 and the engines stepped up in power.

The series 40 Buick for 1937 has a 122-inch wheelbase and is powered by a 100 horsepower valve-in-head straight eight engine, as against 118 inches wheel base and 93 horsepower last year.

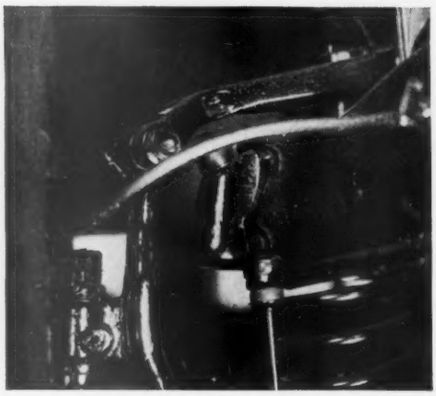
The series 60, 80 and 90 are powered by a 130 horsepower engine, a boost of 10 horsepower over last year's engine for these models. Wheelbases of the 60, 80 and 90 models are 126, 131, and 138 inches respectively.

The stepping up of the power in the series 40 engine was accomplished by a series of improvements including an increase of ¼-inch in the stroke, which stepped up the displacement to 248 cubic inches, adoption of streamline intake valves, and a new exhaust system with decreased back pressure.

Similar refinements resulted in increasing the horsepower of the larger engine from 120 to 130. This engine now has a 3 7/16-inch bore and 4 5/16-inch stroke, 320.2 cubic inch displacement and a compression ratio increased from 5.45 to 5.75 to 1.

Engine lubrication is by pressure to all main, connecting rod, and camshaft bearings and rocker arm shaft bushings. There is positive feed also to the timing chain and valve lifter mechanism and the cylinder walls are bathed in a constant spray of oil.

This year Buick has eliminated the need of an oil filter by means of a new type of floating oil pump screen and inlet pipe. This new device floats the mouth of the inlet pipe and oil screen near the top level of the lower crankcase, drawing oil from the top only, so that any dirt or sludge formation is not permitted to enter the circulating system.



The Buick upper control arm, shown here on the series 40, now has two lubrication fittings at the outer end in place of the one last year. (Photo-Chek Service, Chicago)

In the cooling system of the 1937 Buick engines, the recirculating system has a special by-pass valve which permits anti-freeze mixture to circulate freely without expansion and consequent overflow.

Buick this year introduces the new aero-type carburetor. It is a dual float, single bowl carburetor of the dual down draft type. The outstanding feature claimed for the new carburetor is the design and location of the bowl and float mechanism, which provide for a constant supply of mixture to the cylinders regardless of the angle of the level at which the carburetor is tipped and regardless of the level of the fuel in the bowl when subjected to violent changes of direction or velocity.

Anodized light-weight alloy pistons are fitted with two compression and two oil rings, the compression rings slightly tapered across the face to produce a closer fit between ring and cylinder wall during the engine's early life.

Other features include an automatic choke with provision for automatic deflooding, automatic idle control, automatic heat control of the intake manifold, and vacuumatic spark advance.

From a lubrication standpoint, probably the outstanding change is found in the series 40 and 60 rear axles, which are now hypoids. Although the series 80 and 90 rear axles are of the spiral bevel type, lubrication specifications are the same for all four models. Buick has altered its original 1937 rear axle lubrication recommendation, and instead of an SAE 90 and 160 e.p., it now specifies a hypoid lubricant. Buick dealers are being told not to drain the original factory fill until spring, except in special cases, when the use of the hypoid lubricant distributed by Chevrolet to its dealers is advised.

CHANGES are few on the independent front wheel suspension, which is similar to last year's design. On the series 40 and 60 there is a new lubrication point, on the intermediate steering arm, which can be reached from the bottom. It is located directly in the center of the suspension system and requires a chassis lubricant every 1000 miles.

The upper control arms of the wheel suspension system now have two pressure fittings at their outer ends, in place of the one for each arm last year.

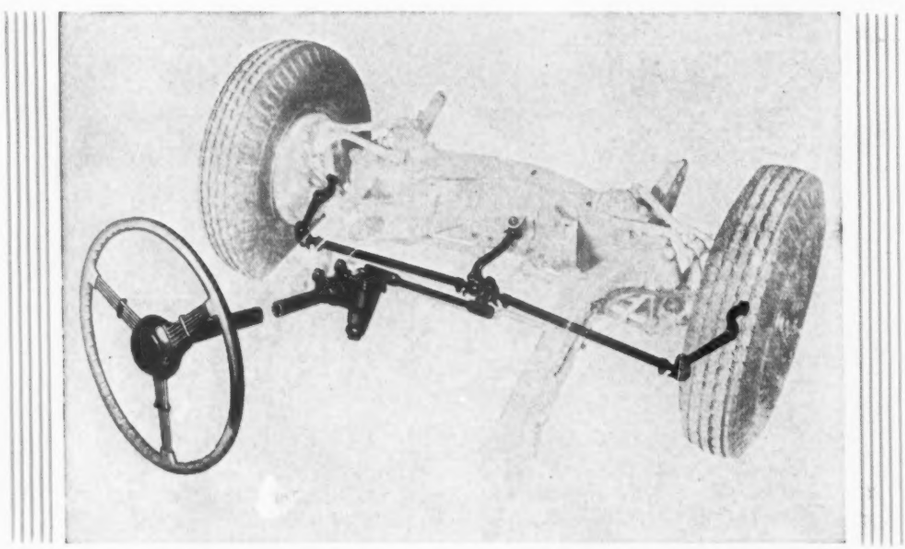
Rear wheel bearings, a troublesome lubrication point last year, this year are lubricated from the axle housing.

A new lubrication point is to be found on the front end of the series 90 torque tube. It has a screw plug which must be removed every 1000 miles and engine oil added.

It is now recommended that the transmission level be checked every 1000 miles, instead of "frequently," as was formerly recommended. Specifications call for an SAE 160 lube for summer and 90 for winter. It is recommended that the transmission be drained, flushed and refilled twice a year.

A pressure fitting which was located on the pedal shafts of all models last year, is now on the series 40 only and takes a chassis lubricant every 1000 miles. Other new points include a pressure fitting on the series 40 clutch pedal equalizer shaft. Both points require a chassis lubricant every 1000 miles.

Last year only the series 40 water



The center point steering mechanism used on all 1937 Buicks

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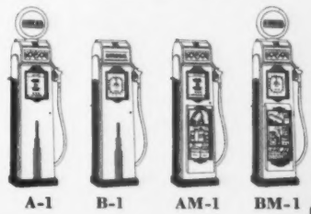
- **AM-1—Computapex — with 3 shelf cabinet.**
- **BM-1—20 Gallon Dial Meter with 3 Shelf Cabinet With globe holder and standard decoration on glass panels.**



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AMERICA'S FINEST GASOLINE PUMP

pump and fan were lubricated with light engine oil through an oil cup. On the new Buicks, all series will use a 10-W engine oil for these points. Lubrication is specified at 1000-mile intervals.

Engine oil specifications remain the same as last year, with viscosities ranging from 10-W plus 10 per cent kerosine to S.A.E. 30. Following last year's plan, Buick again recommends an oil change every three months.

A steering gear lubricant is specified for the steering gear, with the caution that a pressure fitting must not be used in the filler plug hole when filling the gear as this will force oil up the steering column.

In lubricating the front wheel bearings, the wheel, wheel hub and drum are removed as an assembly. It is recommended that one tablespoon of wheel bearing lubricant be applied to each ball bearing. At the same time the felt oil seals should be examined for wear or leakage.

Capacities, for the most part remain the same. Crankcase capacity is the same, with 6 quarts for the series 40 and 8 quarts for the other models. Rear axle capacity on the series 40 remains at 3 pints and on the series 80 at 4 pints. The series 60 rear axle now requires 3 pints instead of 4, and on the series 90 the rear axle capacity is now 4 pints instead of 4½.

The cooling capacity of the series 40 is the same as last year, being 13¼ quarts. The cooling capacities on the series 60, 80 and 90 remain at 17 quarts.

NOTE

The names of Auburn, Cord, Hupmobile, Pierce Arrow, and Reo, are not included in the following pages of individual car servicing articles.

The 1937 Auburn will not be announced until March.

Cord and Pierce Arrow are identical in their servicing requirements to their respective 1936 models.

Hupmobile, now in process of reorganization, has not started production on its 1937 car.

Reo has discontinued production of passenger cars, devoting its entire production to commercial cars and trucks.

CADILLAC • LaSALLE

Both Cars Use Hypoids; LaSalle Has V-8 Engine

The Cadillac family goes completely to V-shaped motors for 1937, with the change of the LaSalle engines from an 8-in-line to a V-8. Besides the LaSalle V-8, the new Cadillac LaSalle line includes four series of Cadillac V-8s and the V-12 and V-16.

One completely new Cadillac is introduced, known as the series "65," on a 131-inch wheelbase. The LaSalle V-8 develops 125 horsepower, or 20 per cent more than the straight 8 of 1936. The Cadillac 60, which is the smallest Cadillac and similar in lubrication requirements and servicing to the LaSalle, has been boosted to 135 horsepower, an increase of 10 over last year.

The hypoid rear axles has been adopted on the LaSalle and the Cadillac 60, 65, and 70. The company recommends that only Cadillac approved hypoid lubricant be used in these rear axles, such lubricants to be obtained through authorized Cadillac service stations. Cadillac has set up an exchange plan on the rear axle gear assembly at a moderate cost, "if after a long period of use the gears require adjustment or other servicing."

These approved hypoid lubricants are required for all models, regardless of whether or not they are hypoid equipped. It is recommended that the lubricant level be checked every 3000 miles and flushed and refilled every 6000 miles. The company cautions against adding hypoid lubricant, and recommends draining and refilling when level is low.

Among the improvements are; oil bath air cleaners on all models, vacuum booster hydraulic brakes on the V-16, improved carburetion, waxed liner lubrication inserts between the rear spring leaves on the LaSalle and Cadillac 60, and automatic chokes on all models.

The LaSalle and Cadillac 60 each have 21 front end lubrication points requiring a chassis lubricant every 1000 miles. The remaining V-8 models, and the V-12 each have 22 front end points, and the V-16 has 25. The intermediate steering arm fulcrum bolt, a new point, will be found on the LaSalle, Cadillac 60, and V-16.

Universal joint splines on all models except the V-16 have a pressure gun fitting for chassis lubricant every 1000 miles. The V-16 has a plug at this point that must be removed and replaced with a fitting before servicing.

Transmissions on all models require an SAE 90 mild e.p. lubricant for summer and for winter, with a drain and refill every 6000 miles.

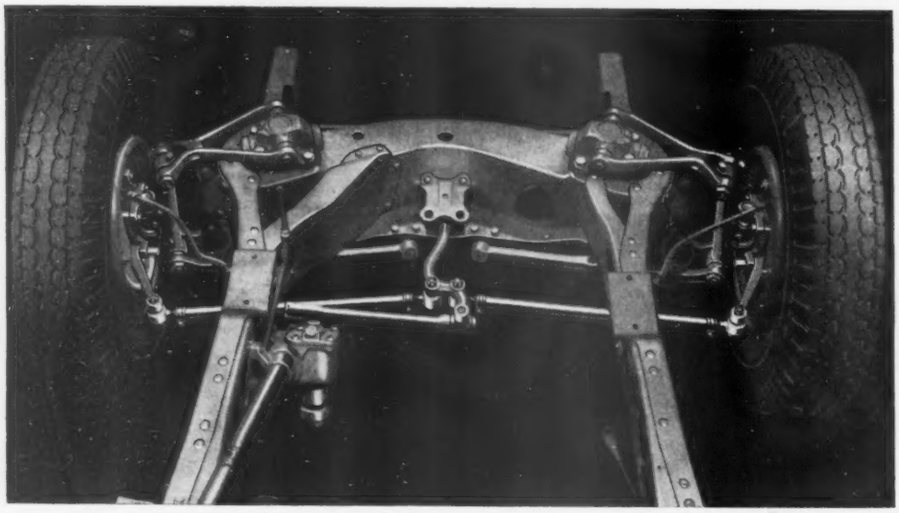
On the LaSalle and Cadillac 60 the pedal shaft and felts take a few drops of engine oil every 1000 miles, while the remaining models are serviced with chassis lubricant through a pressure gun.

The filtering unit of the oil bath air filter should be removed, drained and refilled with one pint of SAE 50 engine oil every 2000 miles, and a new oil filter unit should be installed every 6000 miles. The V-12 and V-16 are each equipped with two air cleaners, and engine oil may be added from either side of the engine of these two models.

Engine oil specifications remain the same as last year, ranging from an SAE 40 for temperatures consistently above 70 degrees, to a 10-W plus 10 per cent kerosine for temperatures between 20 and -30 degrees.

Crankcase capacity has been slightly increased on the V-8 models from 6¾ to 7 quarts. It remains at 9 quarts on the V-12. The transmission capacity is 2.5 pints on all V-8 models, representing a reduction from 4.5 pints on the series 70 and 75. The rear axle capacity is 6 pints on the V-16 and 5 pints on all other models.

Cooling system capacities have been reduced varying amounts on all models. The V-16 takes 24 quarts, the V-12 takes 17 quarts, and the remaining models each hold 25 quarts.



The cross-link type of steering mechanism adopted on the 1937 Cadillac and LaSalle models. A new point on the LaSalle, and Cadillac 60 and V-16, is the intermediate steering arm fulcrum bolt. It requires a chassis lubricant every 1000 miles

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CHEVROLET

Factory-Approved Lubricant Specified for New Hypoid Rear Axle

Two series of cars comprise the 1937 Chevrolet line — the Master and the Master DeLuxe models. They are identical in chassis, engine and body design, except for their front spring suspension, rear axle and steering ratios, and trim and accessory equipment.

Knee action, formerly optional as an extra, is now standard equipment on all De Luxe models at no extra cost. The Master models are obtainable with semi-elliptic front springs only.

The Chevrolet engine is still a valve-in-head six. The engine bore has been increased and the stroke decreased to give an increase in displacement to 216.5 cubic inches. The compression ratio has been increased from 6 to 1 to 6.25 to 1.

The new engine has four crankshaft bearings, instead of three, with an 8 per cent increase in main bearing area. Crankshaft bearings are steelbacked babbitt, and are of graduated diameters, increased by 1/32-inch from the front, which is 2 11/16 inches in diameter, to the rear, which is 2 25/32 inches.

Manifolding has been improved to give better heat control in conjunction with the thermostat control. The outlet to the exhaust pipe is now in the center of the engine.

Accessory equipment includes a new air cleaner with easily removable filtering element; a gear-type oil pump, replacing the former vane type; a shorter, self-adjusting leakproof water pump; and a new design high reserve fuel pump.

There is no change in the knee action front end suspension, except for the use of floating bronze bushings at the upper and lower ends of the king pins in place of needle bearings.

Fuel tank fill pipes have been re-located to extend through the right rear fender. Fuel tank capacity is 14 gallons, except on the business coupe, which is equipped with an 18-gallon tank mounted in the center of the chassis. On this latter model the fuel fill pipe is just ahead of the right rear fender. Radiator and crankcase fillers are also located on the right side this year.

The Chevrolet water pump is fitted with an oil cup, located just behind the fan belt pulley, and requires an engine oil every 1000 miles. The grease cup on the water pump has been discontinued. (Photo-Chek Service, Chicago)

The steering gear is made more accessible and given a more rigid support by re-locating it on top of the chassis frame side rail. The distributor is equipped with a new octane selector, which has a knurled screw by which adjustments may be accurately made. Tire size has been increased from 5.50-17 to 6.00-16.

Steering is improved on the Master models by means of a new shock-absorbing drag link. This link is essentially a floating member, the ball and socket at either end being spring cushioned. It absorbs road impacts before they can reach the steering wheel.

THE steering gear ratio on the de Luxe models is 17½ to 1, while on the Master models it is 16 to 1. Rear axle ratios also vary on the two models, being 4.22 to 1 on the De Luxe, and 3.73 to 1 on the Master.

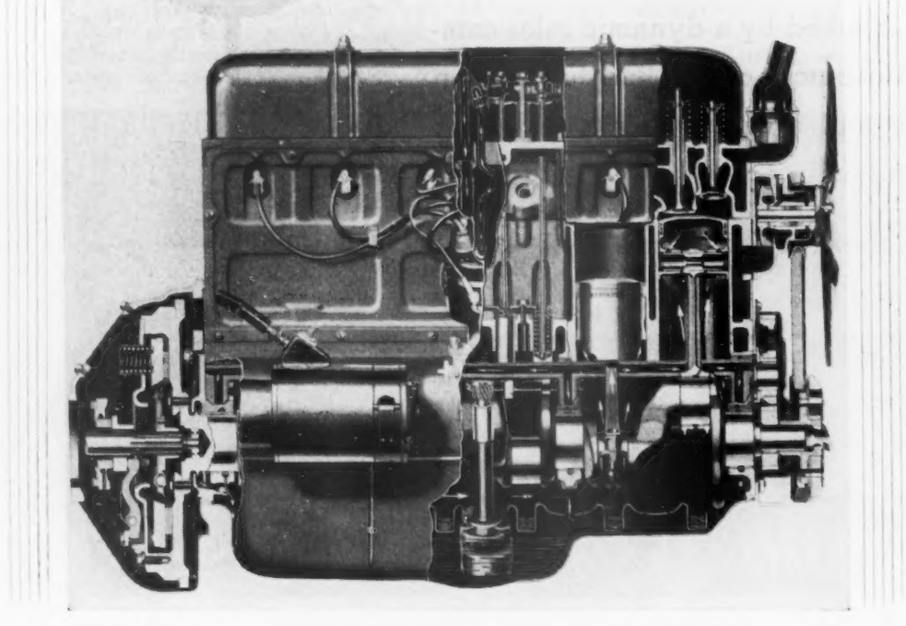
The testing of lubricants for the Chevrolet hypoid rear axles is going on at the present time. Due to an initial lack of time for testing, and to make certain that its dealers were supplied with the lubricant known by Chevrolet to be satisfactory, the company is furnishing its dealers with a supply of hypoid lubricant similar to that used at the factory. This lubricant is supplied in one-pound sealed containers carrying the General Motors parts emblem and is dispensed through a special gun which is being supplied to all Chevrolet dealers. Chevrolet has issued two lists of commercially available hypoid lubricants that have been tested and approved for use in the 1937 Chevrolet rear axles.

Chevrolet leaves crankcase oil changes to the discretion of the driver, stating that the frequency of the oil change is governed by the mechanical condition of the car and the way it is cared for and handled.

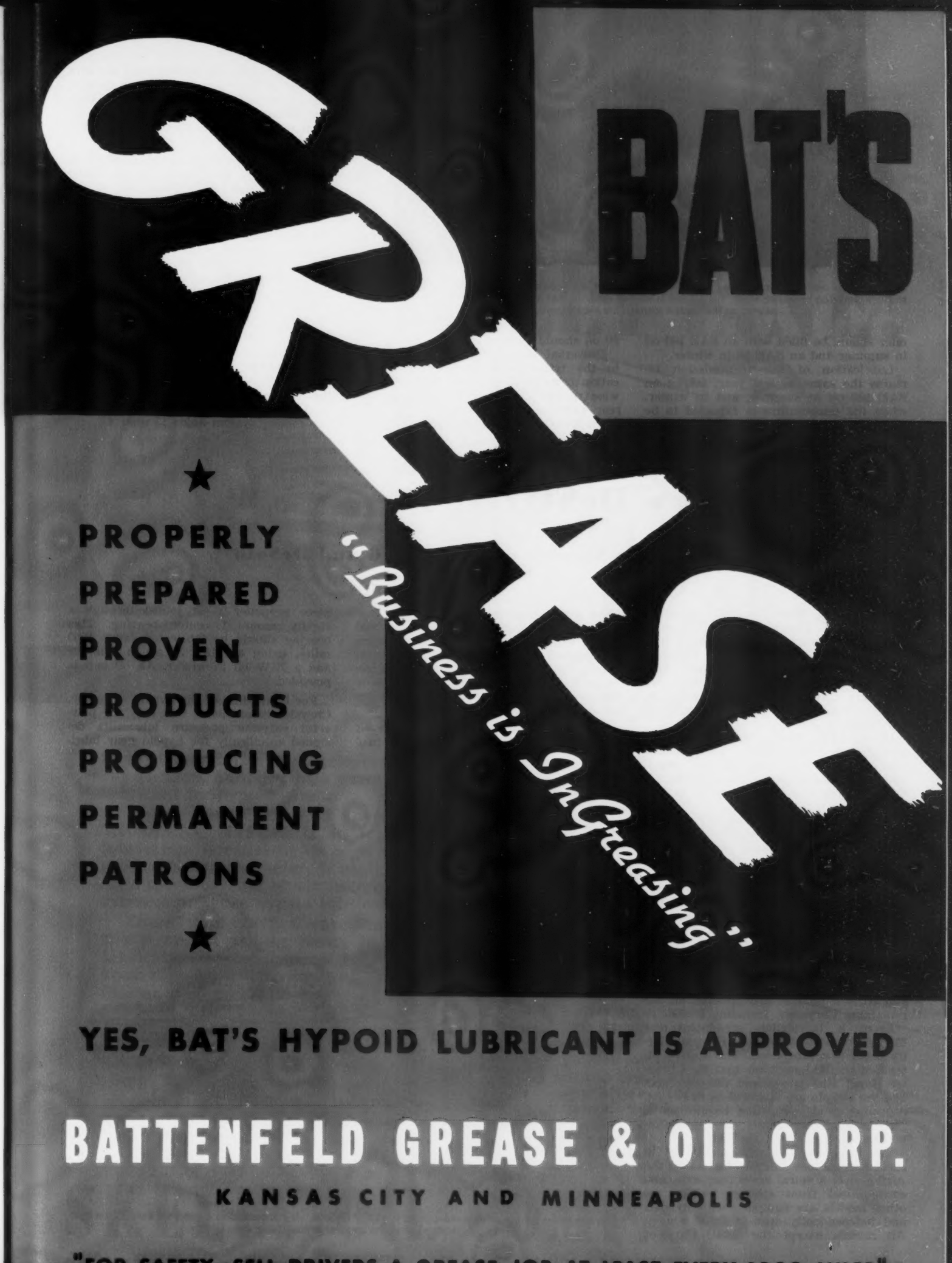
The temperature chart varies slightly from last year. The thermometer indicates the lowest temperature at which the different viscosities will permit easy starting. It shows an SAE 30 down to 50 degrees, an SAE 20 down to 30 degrees, a 20-W to 10 degrees, a 10-W to —10 degrees, and a 10-W plus 10 per cent kerosine down to —30 degrees.

There is an oil cup in the water pump body, just back of the fan belt pulley, which should be lubricated every 1000 miles with an engine oil. This year the grease cup on the water pump has been eliminated.

The clutch throwout bearing requires attention only when a squeaking noise occurs upon releasing the clutch. The



The Chevrolet engine, 85 horsepower, utilizes pressure stream oiling jets, splash oiling, direct pressure to crankshaft bearings, and overhead oiling to the valve mechanism. A gear type oil pump replaces the vane type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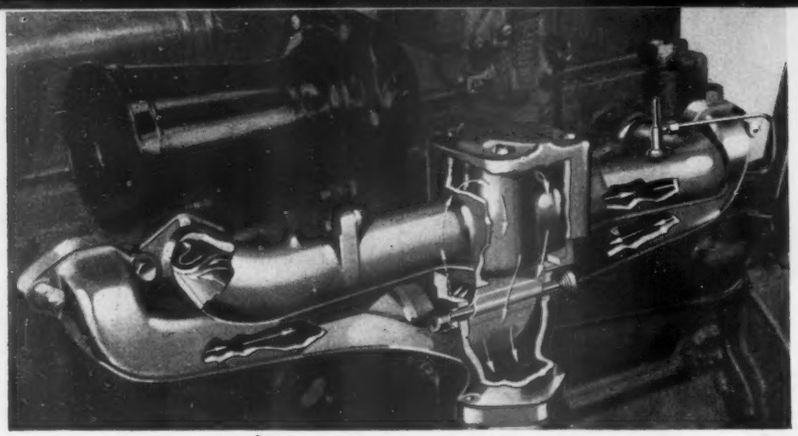


With the new center exhaust outlet on the 1937 Chevrolet, all hot exhaust gases pass through the fuel mixture warming chamber when the engine is started cold, so that a warm mixture is supplied almost as soon as the engine starts. This avoids prolonged choking

oiler should be filled with an SAE 160 oil in summer and an SAE 90 in winter.

Lubrication of the transmission remains the same as last year, taking an SAE 160 oil in summer, and in winter, when the temperature is expected to be consistently under 50 degrees, an SAE 90 oil should be used.

Universal joints are directly connected to the transmission and receive lubrication from it. Rear wheel bearings likewise receive their lubrication from the rear axle, as last year.

On the Chevrolet Master models without knee action, the spring bolts are now located at the rear of the front springs, instead of at the front, as last year. Rubber bushings are used at the front of each rear spring and should not be lubricated or sprayed with oil.

The rear springs are enclosed with metal covers, the spring leaves being coated and the covers filled with a special graphite grease at the time the springs are assembled.

Lubrication of front ends on both models is similar to the recommendations last year, with the exception that the front spring unit spindle bushings on the knee action models are now to be lubricated every 2000 miles, instead of 5000 miles, with soft cup grease, petrolatum, or vaseline.

The 5-quart crankcase capacity and the 14-gallon fuel tank capacity remain unchanged from last year. The capacity of the transmission is now 1.5 pints on both models, the rear axle takes 3.5 pints, and the cooling system holds 13 quarts.

CHRYSLER • DeSOTO

Lubrication Similar on Chrysler 6 and DeSoto

The Chrysler line for 1937 comprises four cars. The six-cylinder Chrysler Royal is this company's new entry into the low-priced field. It has a 93-horsepower engine. The other models are: Chrysler Imperial, with 110 horsepower; Chrysler Custom Imperial, with 130 horsepower; and Chrysler Airflow, with 130 horsepower.

Hypoid rear axles are used on all models except the Airflow, which makes the Chrysler Corp. line almost unanimously hypoid-equipped, including, in addition to the Chryslers, DeSoto, Dodge, and Plymouth.

The independent type of front wheel springing used by Chrysler last year has been retained with minor improvements on all models except the Airflow, the latter using conventional front springs.

As in the Airflow last year, the hoods on all the new Chryslers, including the Chrysler-built DeSoto, hinge in the rear and open upward toward the front. A radiator ornament serves as a hood control lock.

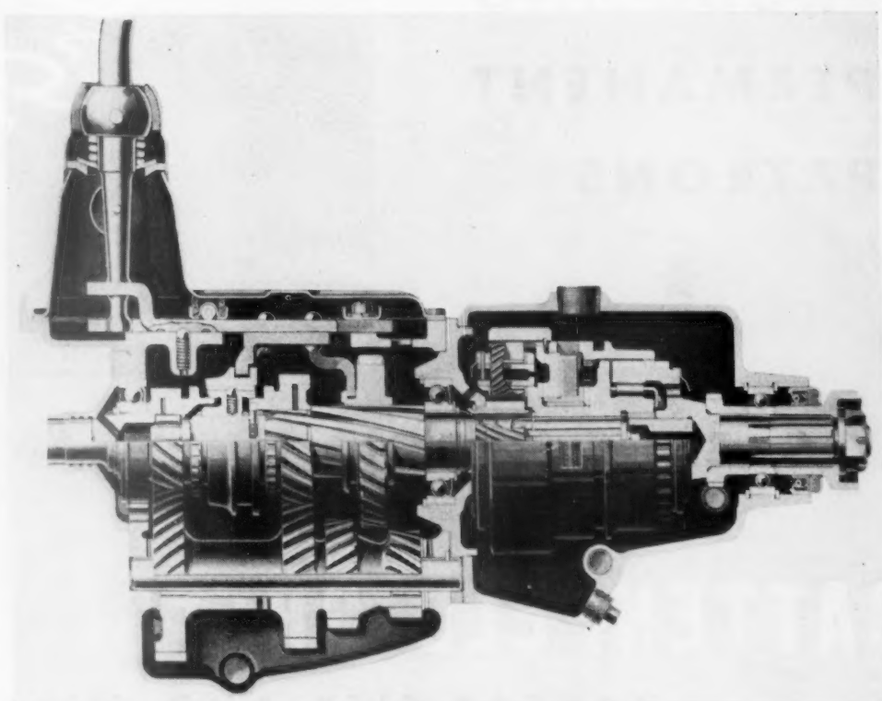
The transmission overdrive is standard equipment on the Custom Imperial and Airflow models, and optional on the remaining Chryslers, including DeSoto.

From a lubrication standpoint the Chrysler models bear a marked similarity, with few exceptions. The station attendant should know, too, that the Chrysler Royal (the low priced Chrysler six) and the DeSoto are identical as to engine, capacities, and lubrication requirements. The DeSoto, incidentally, has discontinued its Airflow model for 1937.

The exceptions to the similarity in servicing the new Chryslers are that the Airflow has a spiral bevel rear axle, and conventional front springs, while the other models are equipped with hypoids and independently sprung front wheels. All models except the small Chrysler have a propeller shaft splined joint that requires a chassis lubricant every 2000 miles, while on the Royal no lubrication is required at this point. All universal joints are "factory lubricated" and require no additional lubrication for two or three years — or 30,000 to 40,000 miles of ordinary driving.

The seven-passenger sedan models of the DeSoto and Chrysler Six have a two-piece propeller shaft joined through a rigidly mounted center bearing. This bearing should be lubricated every 1000 miles, using an SAE 30 oil in summer and a 20-W oil in winter. An oil cup is provided.

For lubrication of the hypoid rear axle, Chrysler recommends that only the powerful extreme pressure lubricants designed specifically for hypoid gear lubri-



The gas saver transmission available on the 1937 DeSoto. It is mounted in a separate case in the rear instead of in the regular transmission case

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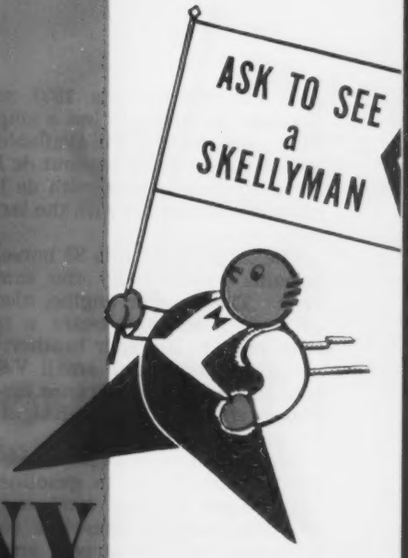

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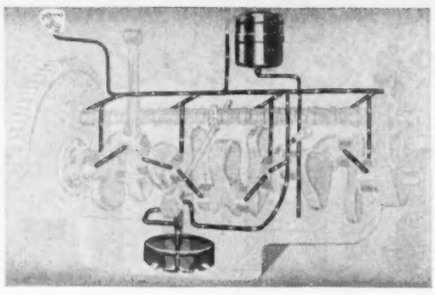
cation should be used. For summer the SAE grade as specified by the refiner is recommended, and for winter an SAE 90 powerful e. p. lubricant (low pour test). Where only mildly low temperatures are encountered, an SAE 110 powerful e. p. lubricant (low pour test) is recommended.

Chrysler recommends that the hypoid rear axles be drained, flushed out thoroughly with flushing oil (not kerosine), all flushing oil completely removed and refilled with the proper grade of lubricant at least every 6000 miles.

The overdrive transmission, standard equipment on the Chrysler Airflow and Chstom Imperial, and optional at extra cost on the other Chryslers including DeSoto, has lubricant recommendations similar to last year, as follows:

SUMMER	Recommended—S. A. E. No. 70 Aircraft Engine Oil—or; Optional Recommendations — S. A. E. No. 70 Engine Oil.
WINTER— Down to 0° F.	S. A. E. No. 50 Aircraft Engine Oil with low cold test maximum of 10° F.—or; S. A. E. No. 50 Engine Oil with low cold test maximum of 10° F.
EXTREME WINTER— Temperatures consistently below zero...	80% S. A. E. No. 50 Aircraft Engine Oil with low cold test maximum of 10° F. plus 20% Engine Oil No. 10W—or; 80% S. A. E. No. 50 Engine Oil with low cold test maximum of 10° F. plus 20% Engine Oil No. 10W—or; 90% S. A. E. No. 50 Aircraft Engine Oil with low cold test maximum of 10° F. plus 10% Kerosine—or; 90% S. A. E. No. 50 Engine Oil with low cold test maximum of 10° F. plus 10% Kerosine.

For the standard transmission without overdrive, the specifications call for an SAE 160 lubricant for summer above



Both cylinder block and crankshaft are drilled so that oil under pressure is supplied to all vital parts on the new Chryslers

40 degrees F., and an SAE 90 for winter. The transmission, with or without overdrive, should be drained, flushed and refilled every 6000 miles.

On the Chryslers with independently sprung front wheels, two additional pressure gun fittings have been added at each of the upper control arm pivots, requiring a chassis lubricant every 1000 miles. At the pedals and linkage, one lubrication fitting has been added, bringing the total to three at this point. These require a chassis lubricant every 1000 miles. The generator, which has two oil cups formerly requiring an engine oil every 1000 miles, now is to be serviced every 2000 miles.

Rear wheel bearings are now to be lubricated with a short fibre medium wheel bearing grease every 12,000 miles, instead of 6000 miles, as formerly. To lubricate these bearings, it is necessary to remove the plugs at these points and replace with lubricant fittings. The attendant is cautioned to lubricate the rear wheel bearings sparingly, as excess lubricant is likely to be forced through the seal onto the brake linings. The plugs should be replaced when the job is completed.

Only a water pump grease should be used to lubricate the water pump.

Crankcase oil specifications remain substantially the same as last year, ranging from an SAE 40 for temperatures between 70 and 110 degrees, to 10-W plus 10 per cent kerosine between 20 and —30 degrees. It is recommended that oil be changed every 1500 miles during the summer, and at least every 1000 miles during the winter.

It is further recommended that the filter element in the air cleaner be removed every 2000 miles, washed in kerosine, dried thoroughly, and re-oiled with SAE 50 engine oil.

Some changes are to be noted in capacities on the 1937 Chrysler and DeSoto models. Crankcase capacities on the Chrysler Royal and DeSoto have been increased from 5 to 6 quarts, making the latter uniform for all Chrysler models.

The cooling systems on the Chrysler Royal and DeSoto now take 5 gallons instead of 4¾, and these same models, together with the Chrysler Imperial, now have 16-gallon fuel tanks instead of 15.

The rear axle capacity on the Chrysler Airflow has been slightly reduced from 4 1/5 to 4 pints.

The transmission capacity, without overdrive, on the Imperial, Royal and DeSoto has been decreased from 2½ to 2¼ pints. The transmission capacity with overdrive has been lowered from 4½ to 3¼ pints on the Imperial and the DeSoto, and remains at 3¼ pints on the Chrysler Royal.

FORD

LINCOLN-ZEPHYR

Ford Offers 60 and 85 H. P. Engines; Water Pumps Self-Lubricating

Ford offers in its 1937 models two new engines with but a single chassis. Five new models are available in either engine size, with or without de luxe equipment, and six models with de luxe equipment are obtainable with the larger engine only.

The larger engine is 85 horsepower and remains substantially the same as last year. The smaller engine, also a V-8, is 60 horsepower and bears a marked resemblance to its older brother. Although new to America, the small V-8 has been built in England and France for more than a year for Ford cars designed for the European market.

No official utterances come from the Ford Motor Co. as to gasoline consumption claims for the 1937 engines. Unofficially, however, gasoline consumption estimates on the larger engine hover around 21 and 22 miles per gallon, while on the new small engine a Ford salesman will offer you from 25 to 28 miles per gallon.

The new smaller engine is approximately two-thirds the size of the larger unit. Its bore is 2.6 inches, stroke 3.2 inches and piston displacement 136 cubic inches, against 221 cubic inches for the larger engine.

All the refinements of the big engine are incorporated in the smaller unit—cylinder blocks and crankcase cast integral, cast alloy steel pistons and crankshaft, cast alloy iron camshaft, valve seat inserts, dual downdraft carburetor, high compression head, air cleaner, directed-flow crankcase ventilation, and new cooling system.

The new cast alloy steel pistons, having the approximate same rate of expansion under heat as the metal of the cylinder blocks, can be fitted more closely. With this feature and with the increased resistance to wear, Ford claims a low oil consumption over long periods.

The two water pumps are of higher circulating capacity and are located at the bottom of the cylinder blocks, giving a more positive force pump action. The pumps are automatically lubricated and are self-sealing.

The new Ford hood, a la Zephyr, hinges at the back and lifts from the front, the dummy radiator ornament serving as a handle and latch. Headlamps are moulded into the fender aprons.

The battery is located under the hood on the right side. Starter button is located on the dash, and the hand brake has been taken off the floor and placed at the extreme left under the dash.

New-type brakes operate through cables in conduits, and have controlled self-energizing action. It is claimed that axles

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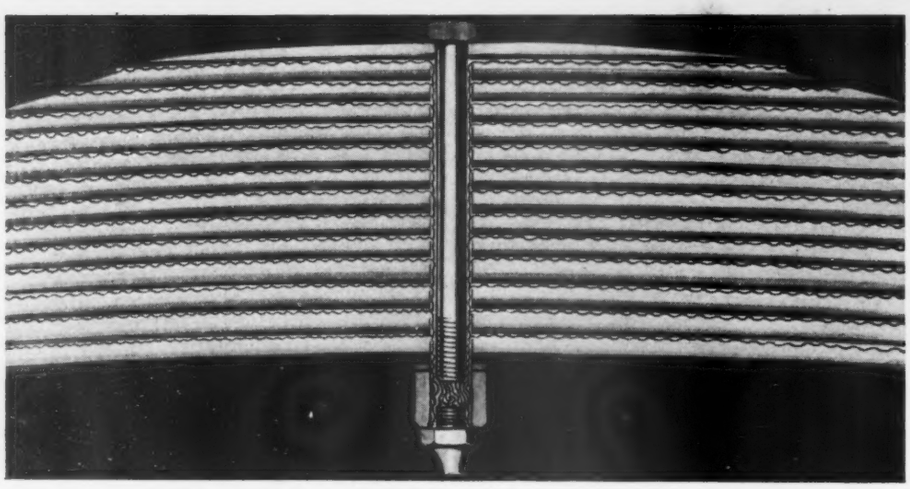


Passageways through the spring bolt and along the full-length grooves in the spring leaves provide a path for positive lubrication of the springs on the 1937 Fords

and spring flexibility are not affected by the brake operation.

The steering gear, of a new worm and roller type, has an increased ratio of 18.2 to 1.

In addition to the water pumps, which are lubricated this year from the oil in the engine, there are other lubrication changes to be noted in the 1937 Fords. With the exception of capacities, the lubrication points and specifications are identical on the 60 and the 85 horsepower cars.

Due to the new cable and conduit method of braking, the four lubrication points formerly at the front and rear brake shafts have been eliminated. One new point has been added at the brake cross shaft, located near the forward end of the drive shaft tube. Another point, which lubricates the drive shaft center bearing, is new and is found midway along the drive shaft tube. Both of these are 1000-mile points and are provided with fittings to take a pressure gun lubricant.

Steering gear and rear axle both require an extreme pressure lubricant for 1937. The steering gear formerly took a straight gear oil. Specifications for these points call for an SAE 90 or 110 e.p. for winter and an SAE 160 e.p. for summer.

In May, 1936, Ford began equipping its cars with grooved-leaf springs held in place by a grooved spring center bolt capped with a lubrication fitting. Lubricant is forced into the bolt grooves and out through the grooves between the spring leaves. This practice is continued for 1937, requiring a Ford spring lubricant No. M-4628, every 1000 miles.

The distributor, which last year required a distributor grease on the cam lobes every 1000 miles, now is a 5000-mile point. The distributor shaft takes an engine oil every 1000 miles, as before.

Transmission requirements are for an SAE 90 or 110 gear oil for winter, and an SAE 160 for summer. Like the rear axle, this point should be drained, flushed and refilled every 5000 miles, or each fall and spring, whichever occurs first.

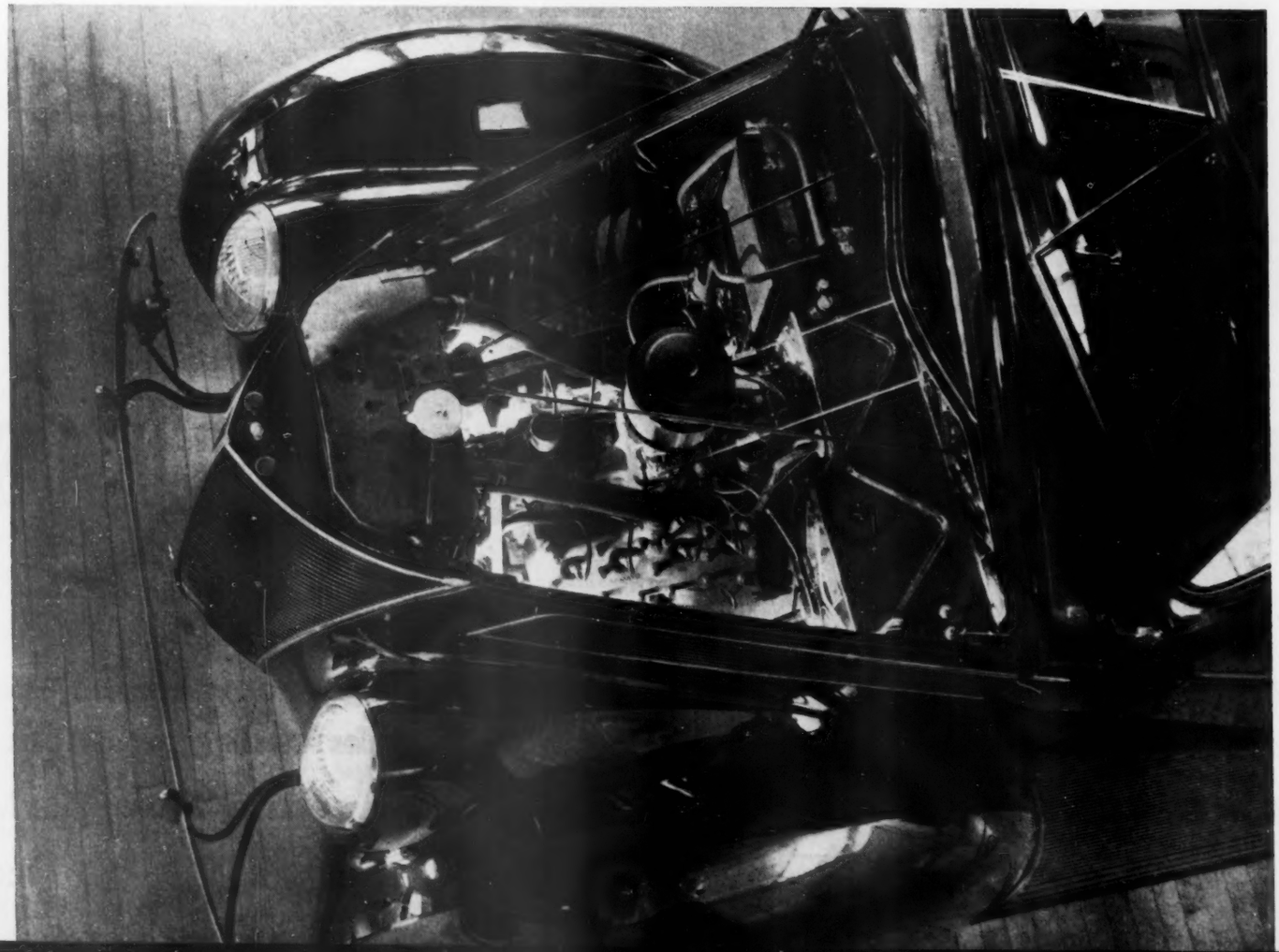
Except for the changes noted, lubrication requirements remain the same as last year. Every 1000 miles a pressure gun lubricant is required at the following points: spindle pins, tie rod, drag link clutch and brake pedal shaft, clutch release shaft, and rear wheel bearings.

Engine oil is required every 1000 miles to lubricate the distributor shaft, generator, fan, brake clevis pins and accelerator. The universal joint, also a 1000-mile point, takes a cylinder oil soda soap grease through a pressure gun fitting.

Crankcase oil specifications remain unchanged, a drain and refill being recommended every 2000 miles. Above 90 degrees an SAE 50 oil is recommended; between 100 and 30 degrees, an SAE 40; between 65 and 20 degrees, an SAE 30; between 50 and 0 degrees, an SAE 20 or 20-W; between 30 and -15 degrees, an SAE 10 or 10-W; and below -10 degrees a 10-W oil plus 10 per cent kerosine is recommended.

On the Ford "85," capacities remain un-

Looking down on the opened hood of the 60 horsepower Ford V-8. The battery is now located under the hood in a recess in the dash, and hood is hinged at the back and lifts from the front



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changed. Transmission and rear axle each hold 2½ pints. The cooling system capacity is 22 quarts, and that of the fuel tank is 14 gallons. Crankcase capacity is 5 quarts.

The capacities of the rear axle and fuel tank on the Ford "60" are similar to those on the "85." However, on the smaller Ford, the transmission holds 1¾ pints, the cooling system takes 15 quarts, and the crankcase capacity is 4 quarts.

The tire size on the "85" remains at 6.00 x 16 as last year, but on the "60" it is now 5.50 x 16.

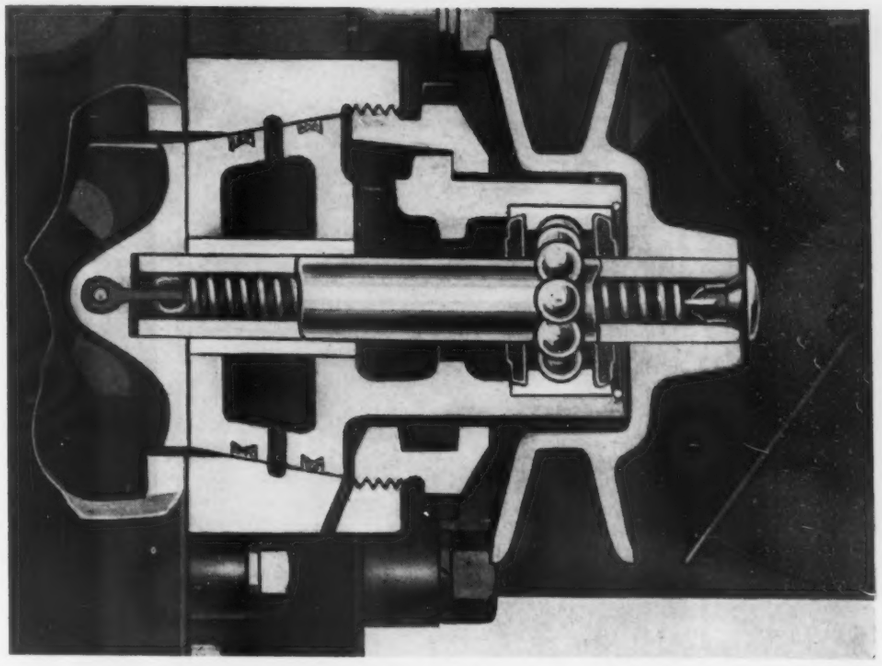
Lincoln-Zephyr

With the following few exceptions, the lubrication requirements and location of points on these models follow closely those of the Ford. The Zephyr has added a strut rod to the front and rear axle to serve as a ride stabilizer. Each rod has two lubrication fittings—one at each end, requiring a chassis lubricant every 1000 miles. This involves no change in the oilless bushings of the spring shackles.

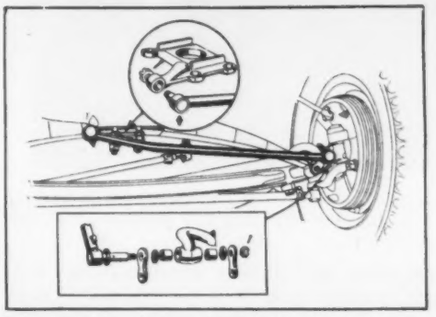
Two water pumps require an engine oil every 1000 miles, a service point not found on the 1937 Fords. On the Zephyr there will be found no brake cross shaft or drive shaft center bearing to lubricate, and there is only one lubrication point on the Zephyr generator.

The Zephyr steering gear takes a straight gear oil, instead of an extreme pressure lubricant, as specified on the 1937 Ford steering gear. Specifications call for an SAE 90 or 110 gear oil for winter and an SAE 160 for winter.

The only other change over the Ford is in the lubrication of the distributor cam lobes. On the Zephyr this takes a Ford distributing grease, No. M-4601, every 1000 miles, while servicing is required every 5000 miles on the Ford.



Cross-section of the 60 horsepower Ford V-8 water pump. The impeller is held by spring tension against the pump body surface. The shaft bushing is automatically lubricated by engine oil and the ball bearing is pre-lubricated and sealed



A strut rod has been added to the front and rear axles of the Lincoln-Zephyr to serve as a ride stabilizer. There is a lubrication fitting at both ends of each rod

• • •

Zephyr capacities remain unchanged from last year. The transmission and rear axle each take 2½ pints, the crankcase capacity is 6 quarts, the cooling system holds 27 quarts, and the fuel tank takes 19 gallons.

Tire size remains at 7.00 x 16.

GRAHAM

Supercharger and Overdrive Reduce Fuel Consumption

Graham, the torch bearer in the field of supercharged engines, continues in that position for 1937, with the announcement that 50 per cent of its 1937 production is expected to include superchargers.

The largest Graham, designated as the Custom Supercharger series 120, has a 116-horsepower engine. It is followed by the series 116, also a supercharged model, with a 106-horsepower engine. The two remaining series, 95 and 85, are not supercharged. Their horsepowers are 85 and 70 respectively.

An improved drive has been developed for the supercharger, the rotor being driven from the crankshaft at 5.75 times engine speed by silent twin "V" belts of a type originally developed for driving airplane propellers. Proper belt tension is maintained automatically.

The supercharger, turning at approximately 23,000 r.p.m. when the engine is turning 4000, "scrubs" the carburetor mixture to a fine mist, brings it to engine temperature and "packs" it evenly into all cylinders at 5 pounds above atmospheric pressure.

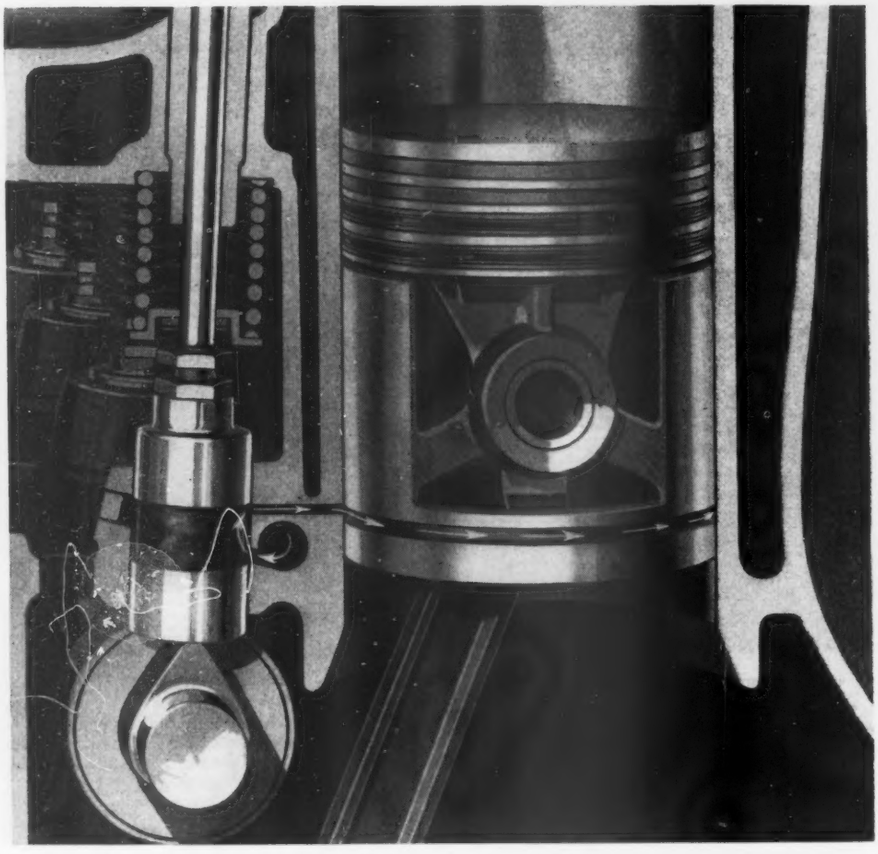
The aluminum alloy pistons are plated with bearing metal and are lubricated by a metered flow of oil forced to the cylinders through the valve lifters. It is claimed that the new combination of bearing metal piston surfaces and ample lubrication will reduce the consumption of oil to a minimum at high engine speeds.

Graham expects to equip 50 per cent of its 1937 models with superchargers, of the type shown here

The crankshaft ends of the connecting rods, which have cadmium silver bearings, have been strengthened. Improved crankcase ventilation has been obtained through a system of breathing in which the rotation of the crankshaft is employed as positive pump to draw fresh air in at the oil filler and force fume-laden air out through the vent pipe.

The water in the cooling system is routed through the supercharger in order to maintain proper temperature control of the fuel mixture. Oil filters and oil bath air cleaners are standard equipment on all models.

A more compact overdrive has been developed in a separate housing as optional equipment at extra cost on all models except the series 85. This device, which cuts in automatically at road speeds above



Lubrication of the pistons, rings, and cylinder walls on 1937 Grahams is accomplished by forcing oil through drilled passages from the valve lifters directly into the cylinders into grooves cut in the pistons to receive the oil

40 miles per hour, reduces the ratio of engine speed to road speed by approximately one-third.

There is a marked resemblance in the lubrication requirements of all 1937 Grahams, and the changes over 1936 are few. The front universal joint spline, which required a chassis lubricant every 2500 miles in 1936, needs no lubrication on the 1937 models. The steering gears, which last year required a Ross approved lubricant, now takes a Kendall gear lubricant or its equivalent every 2000 miles, according to Graham specifications. For the steering gear it is recommended that a No. 250 gear lubricant be used for zero weather, a No. 400 for spring and fall, and a No. 800 for summer.

Front and rear universal joints, which last year were to be repacked with an SAE 160 oil every 20,000 miles, now take a No. 2 Alemite or similar grease. Water pump bearings which formerly required servicing on all models, now need no lubrication attention.

In 1936, the rear wheel bearings on the small Graham required a wheel bearing grease, while on the 1937 models no lubrication attention is required at these points.

Graham continues to recommend oil changes every 1000 miles in summer and 500 miles in winter. Engine oil specifications remain the same, ranging from 10-W for below zero driving, to SAE 40 for summer operation.

An extreme pressure lubricant is recommended for the rear axle, but not for the transmission, and Graham cautions against using such a lubricant in the overdrive transmission. Specifications continue at SAE 160 e.p. for summer and SAE 90 e.p. for winter in the rear axle.

The standard transmission takes the same lubricants, without the extreme pressure qualities, and it is further recommended that an SAE 70 oil be used for temperatures below zero in the standard transmission.

Specifications call for an SAE 70 engine oil in the overdrive transmission for summer operation and an SAE 50 engine oil for winter. Transmission and differential are to be drained and refilled every 6000 miles.

All chassis points remain the same as last year, with the exception of those noted above, and lubrication of the chassis is the same on all 1937 models, with the exception of the fan, which requires an engine oil on the small Graham and takes no lubricant on the remaining models.

There has been no change in capacities for 1937. The crankcase capacity is 5 quarts on all models. Rear axle on the small Graham takes 2 pints, and on the remaining models 2½ pints. On the standard transmission without overdrive the capacity on the small Graham is 1½ pints, and on the larger models 2½ pints. The overdrive transmission, found as optional equipment on all models except the small series 85, takes 3½ pints. Cooling system capacity is 15 quarts on the small model, and 15½ quarts on the larger series. The fuel tank on the small car holds 12 gallons, and on the larger cars 15 gallons.

HUDSON • TERRAPLANE

Improved Carburetion and Manifolding Increase Power and Fuel Economy

● Although the piston displacement on the Terraplane remains at 212 cubic inches and the compression ratio remains at 6.25 to 1, the horsepower on the DeLuxe model has been increased from 88 to 96, and on super-Terraplane to 101. Improved carburetion and manifolding are given the credit for the increase. With an aluminum cylinder head the compression ratio is increased to 7 to 1. The wheel base of the Terraplane is 2 inches longer than the 1936 model. The engine is a six.

Hudson again offers a 6 and an 8-cylinder car for 1937. The horsepower of the 8 has been increased from 113 at 3800 r.p.m. to 122 at 4200 r.p.m., and the 6 engine has been stepped up from 93 to 101 horsepower.

On all models except the DeLuxe Terraplane the engines are equipped with dual down-draft carburetors and a new manifold arrangement. On the Hudson 8's, one carburetor barrel feeds the four center cylinders and the other feeds the four outside cylinders. On the Hudson 6 and Super Terraplane 6 the first three cylinders are fed by one carburetor barrel and the remaining cylinders by the other barrel. On the DeLuxe Terraplane the single carburetor is used with a hand operated choke.

A new larger fuel pump is used this year, provided with a glass trap. The pump has a capacity of 40 gallons of gasoline per hour at an engine speed of 1950 r.p.m. Fuel lines are cooled by being mounted in the air stream and it is believed that this feature, together with the larger fuel pump, will be effective in preventing vapor lock.

Hudson and Terraplane again offer the Electric Hand gear shift as optional equipment. In addition, a selective automatic shift is also offered. Incorporated with the Electric Hand, the new device permits pre-selection of the gears, with not only fully automatic clutch action at all car speeds but also automatic coasting at speeds below 15 miles per hour. With this equipment, there is no need for the use of the left foot in controlling the car.

The Electric Hand remains substantially the same except for a change in the shifter gate. The reverse gate, instead of being just ahead of the low speed slot, is to the side.

Service station attendants, when asked

N. P. N. says this is an advertisement but we say it's national petroleum news.

ALLISON, Ia.

Easy Job For Jobbers . . . .

When Product Has Public Acceptance

IN EVER increasing numbers, distributors of petroleum products are discovering that if there is any short-cut to success, the road to larger volume and profits is paved by public acceptance.

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Mr. L. L. Harms, energetic and resourceful, has built his success upon recognition of this fact. To use his own words, he says: "We appreciate the varied forms of advertising and sales helps furnished by the Phillips Petroleum Company and feel that the Phillips shield creates an inviting appeal and popular appearance to the public. With the radio, billboards, skywriting, newspaper advertising and various other means putting good old '66' before the public we feel that our sales will continue to mount. With this wonderful public acceptance it is much easier to secure and to hold resale accounts.

"We know that the Phillips Petroleum Company is more 'jobber minded' than ever before which is manifested in their ever increasing helpful policy to please the jobber and to help him in various ways to increase his sales of Phillips products. This increase of course means more profit for us.

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Will Phillips 66 products help me increase my volume and profit? That is the question we would like to have you put squarely up to us. That is a question that we will be glad to answer definitely and completely. We will give you case-histories of what others in a position similar to yours have accomplished. We will outline in detail the cooperation you will get. Our answer will be brief, founded on fact, and supported by figures. We would like to make your better acquaintance, so that you'll know why Phillips is everywhere known as "the friendly organization." Wire, write or phone

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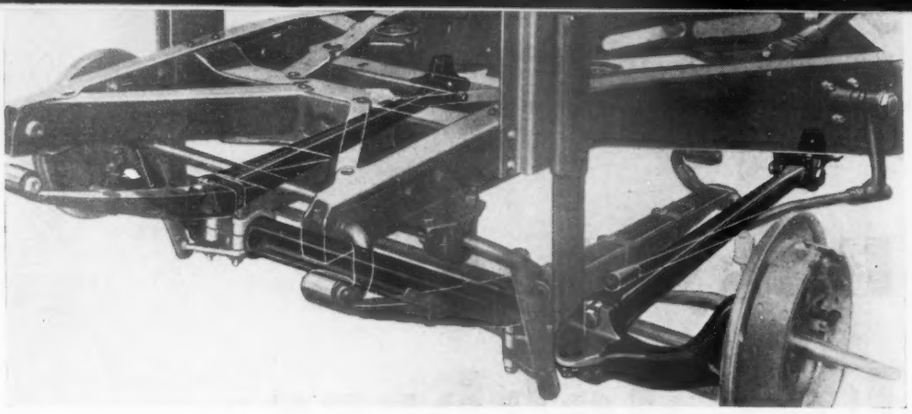
Gasoline and oil business at this station, with Phillips 66 products, is 150% over the nationally-advertised brands formerly handled. Reading from left to right, L. L. Harms, owner. Faith Harms, his daughter. Harold Booklaker, star salesman. Mac McClure, station operator.



Torque arms are rigidly attached to the front axle on the 1937 Hudson and Terraplane models, eliminating a pivot pin which last year required 1000-mile lubrication service

to check the batteries of 1937 Hudsons and Terraplanes, will no longer have to dig up the carpet and floor boards to get at the job. The battery is located under the hood on the driver's side of the car. The battery is cooled by an air stream in a specially formed duct beneath the hood.

Hydraulic brakes are continued as last year, with a mechanical brake linkage providing a secondary protective measure in case of failure of the hydraulic system. The new location of the master brake cylinder is directly on the front of the bracket which carries the clutch and brake pedals.

Following last year's design, the movement of the front axle is controlled definitely by torque arms pivoted to the frame. These torque arms are shorter on the 1937 jobs and are no longer pinned at the front axle but connected solidly by means of a forging.

A hydraulic hill-holder, which prevents the backing of a car when stopped on a hill, is an optional item at extra cost for both Hudson and Terraplanes. This device is actuated by the same fluid used to apply the hydraulic brakes. The clutch pedal is interconnected with a valve, through which the brake fluid passes in the application of the brakes. This valve prevents the return of the brake fluid until the clutch is depressed, thereby keeping the brake applied until the gear change has been made and the driver is ready to start the car forward up the hill.

Lubrication requirements and location of points on the 1935 Hudson are identical to those on the new Terraplanes, the only difference being in the capacities.

On the front end, the steering spindle pins each have one pressure gun fitting requiring a "viscous grease" every 1000 miles. The lubrication points on the torque arm pivots at the front axle are eliminated this year, the torque arm being rigidly attached to the axle, as was mentioned above.

Tie rod ends, which were rubber bushed and required no lubrication attention on the early 1936 models, were later equipped with ball end fittings requiring a chassis lubricant every 1000 miles. These two points will continue to require this lubrication service on the 1937 models.

Front wheel bearings are to be serviced every 5000 miles with a milled sodium soap base lubricant, as are the rear wheel bearings. Front wheels each take 3 ounces, and rear wheels each 1½ ounces.

Steering gears, transmissions, and rear axles each require an extreme pressure lubricant of a mineral oil with an added extreme pressure base of not less than 15 per cent consisting of combined sulphur and saponifiable oils, free from fatty acids. The rear axle, incidentally, is the conventional spiral bevel type.

Summer specifications for the rear axle and steering gear are SAE 160 e.p., a change from SAE 110 e.p. last year. Summer requirements for the transmission are SAE 90 e.p. For winter, the steering gear and rear axle take an SAE 90 e.p. and the transmission uses an SAE 80 e.p. as formerly.

The clutch release bearing requires a viscous grease every 1000 miles. This point formerly took an aluminum soap grease.

It is now recommended that the two needle bearing universal joints be disassembled, cleaned and repacked with a viscouse grease every 10,000 miles. The universal joint spline, which formerly required attention every 2000 miles, now is to be serviced with a viscous grease every 1000 miles.

The distributor, a 2000-mile point, takes a hard grease on the advance cam and engine oil on the top of the shaft, the contact arm pivot, and the shaft oil cup.

It is also recommended that the brake conduits and cables be serviced with graphite grease every 5000 miles. The exposed portion of the cable should be cleaned with gasoline. In order to slide the conduit forward on the cable to expose the cable's entire covered portion it is necessary to remove the cap screws at the front conduit abutment cap, spring clip and rear cable abutment cap, and then remove the caps themselves.

Engine oil is to be drained every 2000 miles, as formerly. Crankcase oil specifications differ from last year's only in the temperature brackets which define the limits at which a certain viscosity oil should be used.

Hudson and Terraplane tie rod ends, which last year required no lubrication, are now equipped with ball-end fittings and take a chassis lubricant every 1000 miles. (Photo-Chek Service, Chicago)

The new crankcase oil specifications read as follows:

Minimum atmosph. temp. expected	Viscosity
50 deg. F.	SAE 30
10 deg. F.	20W
Below -10 deg. F.	10W
Below -30 deg. F.	10W plus 10% kerosine

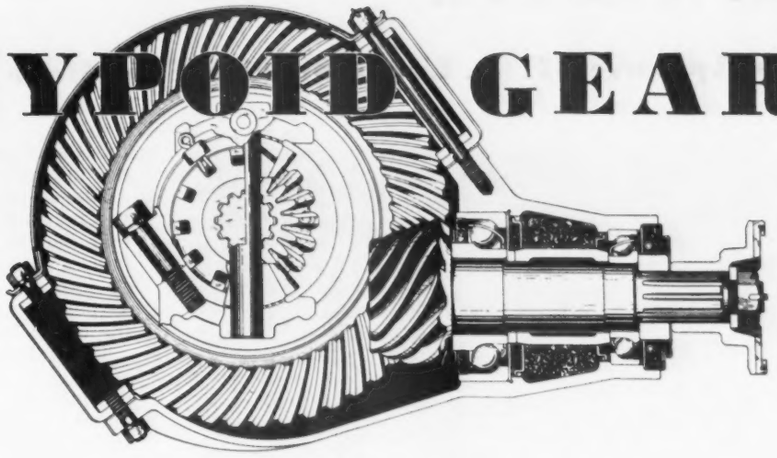
When the car is equipped with an oil bath air cleaner it is recommended that the filter be removed every 2000 miles and that the parts be washed in gasoline. After washing, one pint of SAE 50 (SAE 30 in winter) oil should be poured into the cleaner body and the filter reassembled.

The crankcase capacity of the Terraplane and Hudson 6 remains the same as formerly, with 6 quarts capacity, and 5 quarts for refill. The capacity on the Hudson 8 also remains unchanged, with 9 quarts capacity and 7 quarts for refill.

Differential capacity stays unchanged at 2¾ pints, and the transmission at 3 pints on all models. Gasoline tank capacity is now 16½ gallons on all models, instead of 16, and cooling capacity remains at 13 quarts on the Terraplane and Hudson 6, and 20 quarts on the Hudson 8.

Service station attendants will unanimously approve of the battery location on all 1937 Hudson and Terraplane cars. It is under the hood on the left side, where it can be easily and regularly serviced

HYPOID GEARS



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QUALITY JESCO LUBRICANTS

PROVEN IN SERVICE

NASH • LaFAYETTE

Factory-Approved E. P. Lubes Specified for Rear Axles

● For 1937, Nash offers three cars. Leader in the line is the Nash Ambassador 8, with 125-inch wheelbase and a valve-in-head, twin-ignition engine of 105 horsepower. Second in size of the three cars is the Nash Ambassador 6, on a 121-inch wheelbase, and with a 95 horsepower twin-ignition engine. The small car is the Nash LaFayette "400," with a wheelbase of 117 inches, and having a 90 horsepower engine.

Largely through a stepped-up horsepower these cars now have an improved weight-to-horsepower ratio. A high gear ratio of 4.1 to 1 is found on all the new Nash-built models.

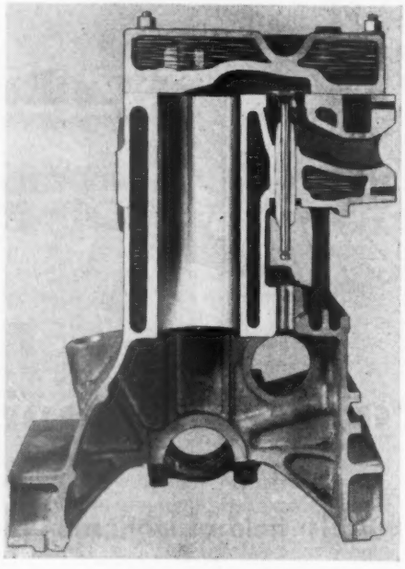
Following its practice last year, Nash has pre-lubricated inserts between its three long spring leaves at the extreme ends. In addition, the springs are packed with a special lubricant which is unaffected in viscosity by extremes of temperature. The springs are sealed by canvas covers, which in turn are fitted with metal covers.

The cruising gear, or overdrive as it is commonly called, is optional on all Nash-LaFayette cars at slight additional cost.

The Nash models retain the system of full pressure lubrication, nine-bearing crankshaft, aluminum alloy invar-strut pistons with four rings and full length water jacketing with metered-pressure cooling feature. The "400" model also has these features, with the exception of the crankshaft, which has seven bearings.

With the following few exceptions the lubrication requirements of the Nash and Nash-LaFayette models for 1937 are the same. The engine oil filler cap is located on the side of the LaFayette engine and on top of the valve cover on the Nash. On the Nash the distributor is located on the side of the engine and on the LaFayette it is on top of the engine.

Lubrication of conventional transmission requires a Nash approved S.A.E. 90 e.p. lubricant, which should be drained every 5000 miles and the case flushed and refilled. Where a transmission and cruising gear is used, the lubricant should be an SAE 70 heavy oil for summer and an SAE 50 heavy oil for winter. Nash cautions against the use of extreme pressure lubricants in cruising gear transmissions. Here, too, it is recommended that the unit be drained, flushed and refilled every 5000 miles.



Full length water jackets on the Nash and Nash-LaFayette engines keep the cylinder walls cool and at even temperatures

A Nash-approved SAE 90 extreme pressure lubricant is recommended for the rear axle, summer and winter. The lubricant level in the rear axle should be checked every 1000 miles and flushed and refilled with a new lubricant every 5000 miles.

Lubrication of the clutch release bearing, formerly a service point on all Nash and LaFayette cars, requires no attention. The water pump now requires a water pump lubricant every 1000 miles on all models. Last year this point required no lubrication on the Nash models.

Grease cups are used for lubrication of the rear wheel bearings. This is a 5000-mile service, requiring a wheel bearing lubricant. It is emphasized that the use of incorrect lubricant may result in a surplus being forced through retainers to the brake linings.

The universal joints are of the needle bearing type, packed with lubricant at the factory. It is recommended that the joints be disassembled every 12,000 miles and repacked with vasoline or light cup grease. The spline shaft of the front joint takes a chassis lubricant every 3000 miles.

Tie rods, steering knuckles, and drag link are to be lubricated with a heavy oil, using a pressure gun. These are 1000-mile points. Spring shackle bolts should be lubricated every 1000 miles with a pressure gun using heavy "chassis oil." The points to be covered are the front and rear ends of both front springs, and the rear ends of both rear springs. The front ends of the rear springs are supported in rubber bushings and require no lubrication. A steering shock eliminator is mounted on the rear of the left front spring, and has two points that require a heavy chassis oil every 1000 miles.

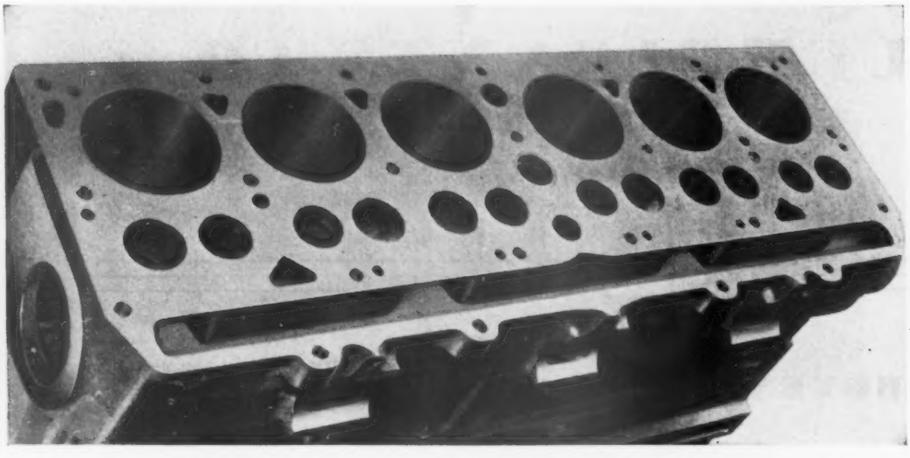
CRANKCASE oil recommendations are the same for all Nash and LaFayette engines. For temperatures between 32 and 95 degrees an SAE 30 engine oil is recommended; between 10 and 75 degrees, SAE 20; between 32 and -10 degrees, 10-W; and for temperatures consistently above 90 degrees, SAE 40.

On the Nash 8, a gage is provided on the left side of the engine. Each graduation of this gage indicates a consumption of about one quart. Readings on this gage should be taken when the engine is running.

Capacity of the crankcase on the Nash 6 and 8 is 7 quarts, and on the Nash-LaFayette, 6 quarts. Capacity of the conventional transmission on all models is 3½ pints. With the overdrive, in the two-unit type, the transmission capacity is 6 pints, and the transmission with overdrive in one single unit takes 5½ pints.

Capacity of the rear axle is 6 pints on the Nash 8, and 4 pints on the Nash 6 and Nash-LaFayette. Cooling system capacities have been altered on all models. The Nash 8 takes 18 quarts, the Nash 6 takes 17 quarts, and the Nash-LaFayette takes 20 quarts. The radiator cap is of the cooled sealing type which provides equal distribution of temperatures throughout the cylinder block. Care must be taken to see that the cap is firmly sealed on the gasket and to see that, when replacing the cap, the valves in the cap are seated on their base. A cap not tightened down, or valves misaligned will destroy the sealing function and cause loss of water.

The gasoline tank capacity has been increased to 20 gallons on all models.



The intake manifold is cast inside the block on the 1937 Nash cars

OLDSMOBILE

Hypoid Lubricant Specified for Spiral Bevel Axle

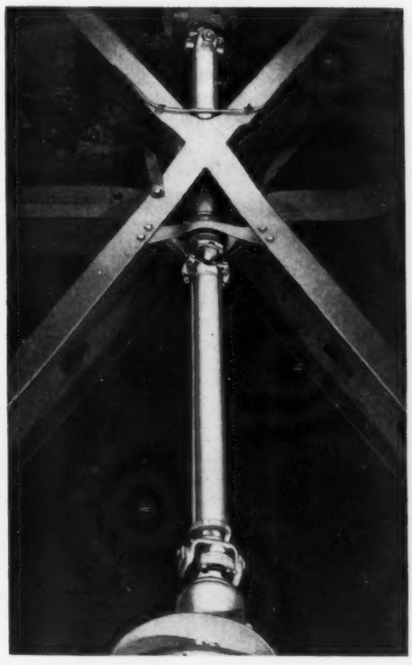
● The 1937 Oldsmobile Six develops 95 brake horsepower, as against 90 on the 1936 model. The Eight develops 110 horsepower, an increase of 10 over the previous Eight. Wheelbases of the Six and Eight have been increased respectively to 117 and 124 inches.

Oldsmobile has eliminated the tunnel in the rear compartment without resorting to the hypoid rear axle. The propeller shaft, which is in reality two shafts, employs three universal joints instead of the conventional two. The added center joint is locked in and supported by the cross-member of the frame. With this design the rear half of the shaft is deflected at an angle sharp enough to avoid the rear floor. The universal joints are of the "Mechanics" type and require no lubrication attention.

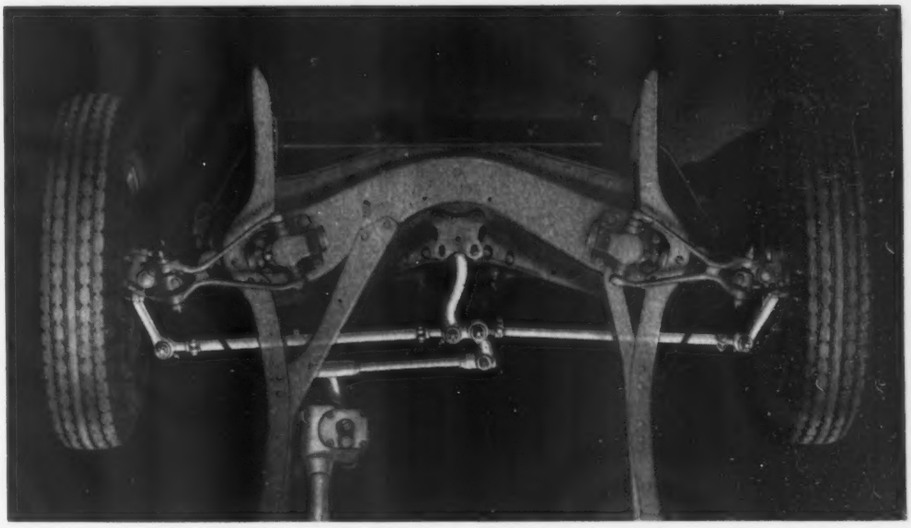
Although Oldsmobile is using a spiral bevel rear axle, the tooth pressures have been materially increased to the point that it has become necessary to recommend a hypoid lubricant for this service. At present, Oldsmobile has no approved list of hypoid lubricants, relying on the Chevrolet list as a basis for proper servicing.

For the first few thousand 1937 Oldsmobiles to come off the line the rear differential cover was welded to the banjo housing. On these models there is a fill plug, but no drain plug, with the result that flushing and cleaning of the rear axle before refilling will be next to impossible.

On later jobs the cover is bolted to the banjo housing, so that complete flushing and draining may be accomplished by removing the cover. A supply of gaskets will be necessary, as in many cases the old ones will not be in condition to put back on the axle.



This two-piece Oldsmobile propeller shaft permits the floor to be lowered 3 inches without resorting to a hypoid rear axle. The universal joints require no lubrication attention



The center-control steering mechanism employed on the 1937 Oldsmobiles. The intermediate steering arm bearing adds a new lubrication point

Automatic control is provided for the operation of the choke, the spark advance, idling speed and the temperature of the engine and of the fuel mixture.

The engines operate at the compression ratios of 6.1 to 1 for the Six and 6.2 to 1 for the Eight. Motor blocks are cast integrally with the crankcase and provide full length water jackets which completely surround each cylinder. Direct "pipe line" cooling is provided for the exhaust valves.

Both cars continue with the type of independent front wheel suspension used last year, and center-control steering is employed. A new lubrication point, an intermediate steering arm bearing, is found just in front of the inner tie rod ends. This point takes a chassis lubricant every 1000 miles.

Water pump bearings are designed with a permanent lubrication system which require no service attention. The pumps are leak-proof. These bearings were formerly oiled every 1000 miles with an engine oil.

Cooling system capacities have been increased to 16 quarts on the Six, and 20 quarts on the Eight. All other capacities remain the same as last year.

All other lubrication requirements, with the exceptions noted above, are similar to those on the 1936 Oldsmobile. The transmission takes a regular SAE 160

Oldsmobile recommends that the crankgear lubricant for summer and an SAE 80 for winter.

case be drained and refilled when an inspection shows the oil to be thinned to a point where it no longer possesses good lubricating qualities. It is further recommended that the oil pan be dropped and thoroughly cleaned every 10,000 miles.

Crankcase oil specifications call for an SAE 30 engine oil for summer temperatures above 40 degrees. For winter an SAE 20 is specified between 50 and 30 degrees; 20-W between 50 and 10 degrees; and a 10-W between 30 and —10 degrees. For lower temperatures, a 10-W plus 10 per cent kerosine is recommended.

All front end chassis points, including upper and lower control arm pivot pins and shafts, tie rods, and drag link are to be lubricated every 1000 miles with a chassis lubricant. Propeller shaft spline, clutch auxiliary shaft, and rear spring shackles also take a chassis lubricant every 1000 miles.

This threaded shackle is similar to the type used on the majority of the 1937 cars

PACKARD

Lubrication Simplified • New Six Introduced

● The Packard Six has a wheel base of 115 inches and is presented in eight different body styles. The "120" repeats this year with a 120-inch wheel base and eight body types. The Super Eight offers three wheel bases, 127, 134 and 139 inches with eleven body styles. The Twelve also is offered in three wheel bases, 132, 139 and 144 inches, with eleven body types.

Although it has a five-inch shorter wheel base and is somewhat lighter than the "120", the new Packard Six is similar in most respects, and many of the parts are interchangeable between the two models. This is true of the semi-centrifugal clutch, the transmission, rear axle, steering gear, and Safe-T-fleX front wheel suspension. This type of individual front wheel springing is included on all Packard models for 1937 and involves no new lubrication points.

The Packard Six has a six-cylinder L-head engine which develops 100 brake horsepower. It is equipped with hydraulic brakes, the same type as those used on the "120". All Packard models now have hydraulic brakes, with the Twelve being augmented by a booster. Last year only the "120" had this type of braking system; all other models had the mechanical type with a vacuum booster.

Engine improvements, including angle-set valves, spring damper-type oil control piston rings, and full sized water jackets, are claimed to greatly increase gasoline economy and also oil economy, especially at higher speeds. In actual road tests Packard engineers claim to have shown a 200 per cent improvement in oil economy at 75 miles per hour, and less oil consumption at 35,000 miles than at 10,000 miles, a complete reversal of normal experience. Liberal use of ball and roller bearings throughout the car, 46 in all, assist in improving the effortless operation of the cars.

The Packard Six has a 6.3 compression ratio and uses a cast iron cylinder head. The other models, using an aluminum cylinder head, have a 6.5 compression ratio, excepting the Twelve, which has 6.4.

Crankcase oil capacities remain the same, with the Six and "120" each taking 7 quarts. Oil bath type air cleaners are standard equipment on all models. Engine oil specifications are identical to those of last year, as follows:

90 deg. F. and over—S.A.E. 40.
40 deg. F. and over—S.A.E. 30.
25 deg. F. to 85 deg.—S.A.E. 20 or 20-W.
10 deg. F. to 85 deg.—20-W.
—10 deg. F. to 45 deg.—10-W.
Below —10 deg. F.—10-W plus 10% kerosine.

Instructions call for a drain and refill every 2000 miles.

Packard has discontinued its Bijur one-shot lubrication system which were on its larger models, and as a result there is a marked similarity between the lubrication requirements on all models.

All lubrication requirements are divided into 2000 and 10,000 service intervals. Steering knuckle pins, steering connecting rod, and tie rods are 2000-mile points requiring a pressure gun lubricant. The Six and the "120" each have four pressure gun points on the rear spring shackles, while the other models each have two. These are 2000-mile points.

The universal joint spline, formerly a 10,000-mile point, is now to be serviced every 2000 miles. All models have one pressure gun point for this service. Water pump shaft, starting motor, and generator require an S.A.E. 30 oil every 2000 miles on all models, and the distributor shaft takes a No. 3 cup grease at 2000-mile periods on all models except the Twelve, the latter having two oil cups which are to be filled with an S.A.E. 30 oil.

The clutch and brake pedal shaft on all oil models except the Twelve have two wicks which require attention each 2000 miles with an S.A.E. 30 oil.

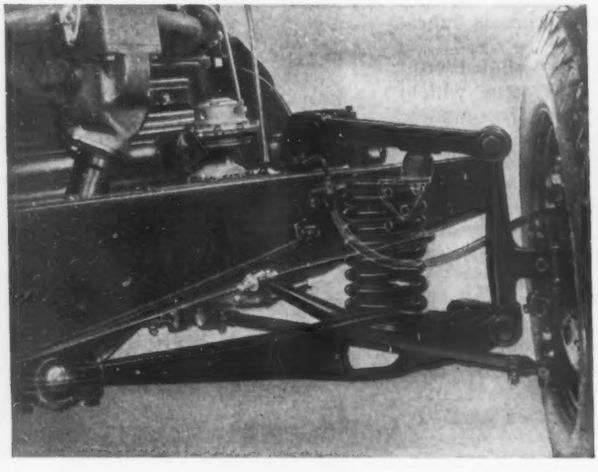
The outer support arm pins on the front end suspension of all models have two lubrication points requiring a pressure gun lubricant every 10,000 miles. Transmissions, to be serviced every 10,000 miles with a drain and refill, take an S.A.E. 160 gear oil for summer and S.A.E. 90 for winter. The steering gear, which formerly was to be serviced by the Packard dealer with an E. P. lubricant, now follows the same specifications as the transmission.

A HYPOID rear axle is used on all models, with specific instructions to the car owner to have this point drained and refilled by a Packard dealer every 10,000 miles. Universal joint journals require no lubrication attention, except on the Twelve, where two points require a chassis lubricant every 10,000 miles. The clutch throwout bearing is packed at the factory and needs no further lubrication attention.

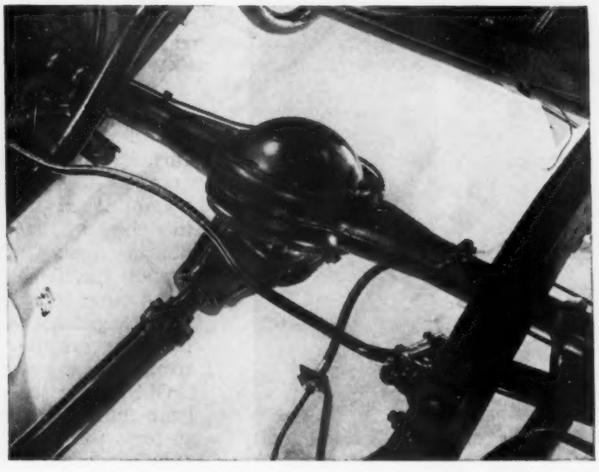
Capacity of the transmission on both the Six and the "120" is one quart, while on the other models it is 4½ pints. The cooling system capacity on the new Six is 4½ gallons; on the "120" it is 5 gallons, formerly 18 quarts; on the Super-Eight 6 gallons; and on the Twelve 10 gallons.

The capacity of the gasoline tanks remains the same as last year, with the Six holding 17 gallons. All models are equipped with an electric gasoline gauge.

An oil filter is included as standard equipment on the two larger Packard models, but on the Six and "120" it is special.



The Safe-T-flex individual front wheel suspension, introduced two years ago on the Packard "120", is used on all new Packard models



The hypoid rear axle on the Packard Six. This type of axle is used on all 1937 Packard models

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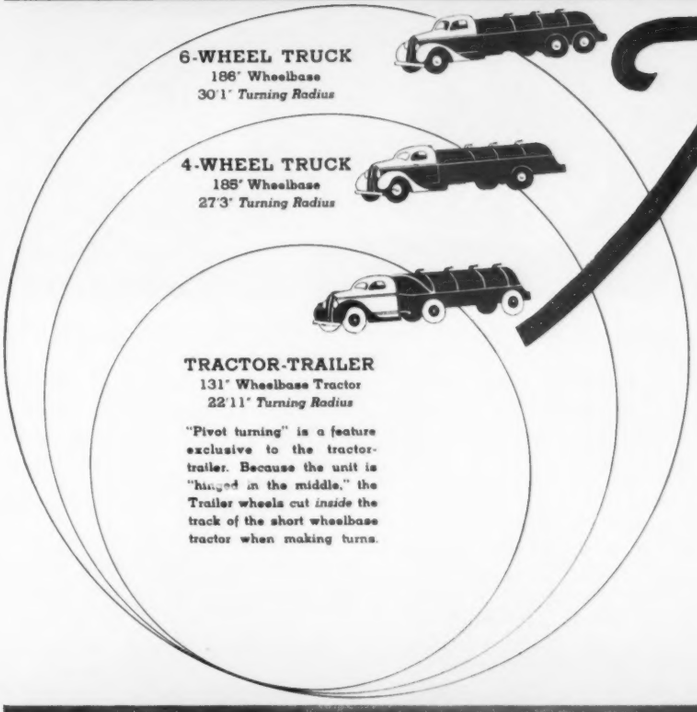
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DODGE • PLYMOUTH

Lubrication Requirements Identical; Both Cars Feature Hypoid Axles

● An outstanding feature of both Plymouth and Dodge for 1937 is the hypoid rear axle. This feature is new to Plymouth, but was introduced on the Dodge in May this year. From a lubrication standpoint, these two new cars match point for point, with the exception of certain capacities, which will be mentioned later.

Both cars offer wider and roomier bodies, with the Plymouth having an overall length of 194 inches. The bodies of both cars are pillowed on short outrigger brackets containing live rubber supports which act as a cushion for the weight of the bodies. With this design, metal to metal contact between the bodies and the frames is eliminated, with a resulting reduction in vibration and road noise.

Greater stability on the Plymouth is attained by increasing the rear tread to 60 inches. On the Dodge, the engine has been moved farther ahead, advancing the front and rear seats so that the rear seat passengers ride ahead of the rear axle and the weight carried on the springs is evenly divided between front and rear.

The 82-horsepower Plymouth engine and the 87-horsepower Dodge engine are retained. Both engines include full length water jackets, 4-ring aluminum pistons, and valve seat inserts. The engines are sixes.

It is recommended that the hypoid rear axles of both cars be drained, flushed, and refilled with a powerful extreme pressure hypoid gear lubricant every 6000 miles. An SAE 90 e.p. is specified for winter, and for summer it is suggested that the SAE grade recommended by the refiner be used. The station attendant is cautioned against using kerosine as a flushing oil.

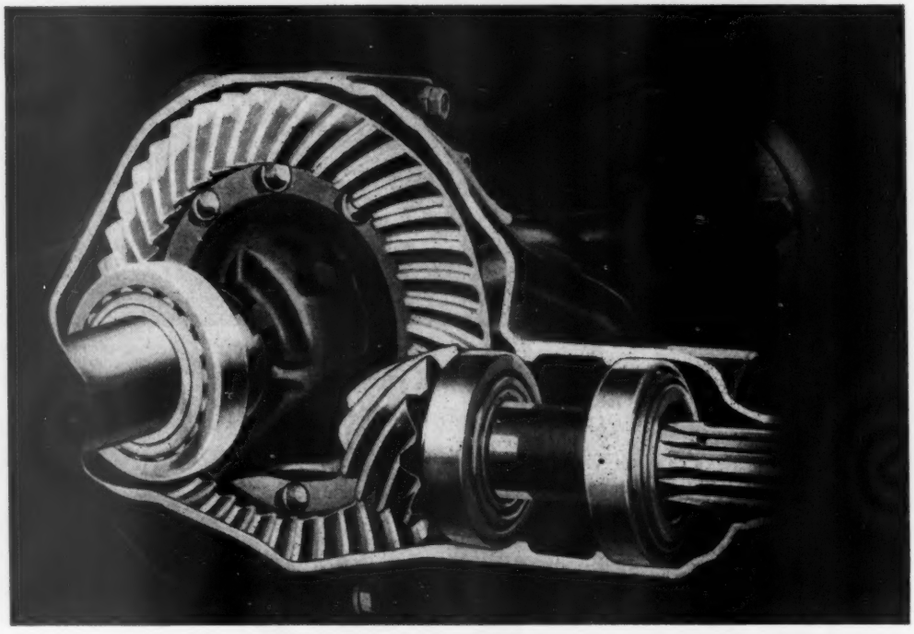
Transmission requirements remain the same as last year, with an SAE 90 fluid gear lubricant being recommended for winter and an SAE 160 for summer.

Engine oil specifications, with one slight exception, are similar to those of last year. The recommended viscosities range from SAE 40 to 10-W plus 10 per cent kerosine. For summer driving, it is recommended that an SAE 30 oil be used between temperatures of 110 and 40 degrees F. Last year the lower limit in this bracket was 30 degrees. Oil changes are recommended every 1500 miles during the summer and at 1000-mile intervals in winter.

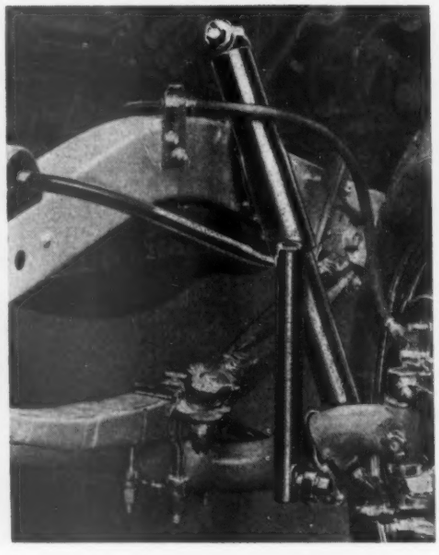
Each steering knuckle king pin bushing now has two pressure gun fittings, instead of one, as last year. The drag link ball joint, with one fitting, is now a 1000-mile service point, instead of 6000 miles. The pedals and pedal linkage, which formerly had two lubrication fittings, now have two, requiring a semi-fluid chassis lubricant.

Rear wheel bearings, formerly 6000-mile points, now require lubrication only at 12,000-mile intervals. In place of the lubricant fitting at each rear wheel bearing, there is now a plug. This plug should be removed and replaced with a lubricant nipple. The lubricant recommended is a medium short fibre wheel bearing grease which should be used sparingly to avoid forcing any excess grease through the seal and onto the brake linings. The plugs should be replaced when the servicing job is completed.

A lubricant fitting has replaced the cup on the distributor shaft, and it is recommended that a short fibre medium grease be used every 2000 miles. The generator, with two oil cups, which were formerly 6000-mile points, is now to be lubricated every 2000 miles. The water pump, with one lubricant fitting, takes a water pump grease every 2000 miles, as in 1936.



This hypoid rear axle is standard equipment on the 1937 Plymouth. Dodge has used a hypoid axle since last May



Front end design of the 1937 Dodge, showing the new ball-jointed sway eliminator, and airplane type shock absorber

The clutch release bearing and universal joints are packed with a lubricant at the time of assembly and require no further lubrication.

The seven-passenger sedan models of Dodge and Plymouth have a two-piece propeller shaft joined through a rigidly mounted center bearing. This bearing is to be lubricated every 1000 miles through an oil cup, using an SAE 30 oil for summer and a 20-W oil for winter.

Spring leaves, where springs are covered, should be lubricated through a special fitting with a spring leaf lubricant. It is recommended that this lubricant be obtained from the Plymouth or Dodge. The attendant is cautioned against using a graphite lubricant on the spring leaves. This service is recommended every 12,000 miles.

On the Plymouth, the capacities remain the same as last year, with the exception of the fuel tank which is now 16 gallons, instead of 15. The cooling system capacity is 15 quarts, crankcase 5 quarts, rear axle 3¼ pints, and the transmission 2¼ pints.

On the Dodge, the cooling system capacity has been boosted a quart to 4 gallons, and the fuel tank from 15 to 16 gallons. The transmission, which formerly took 2½ pints, now takes 2¼ pints. The crankcase capacity remains at 5 quarts, and the rear axle capacity at 3¼ pints.

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PONTIAC

Two-Part Drive Shaft Eliminates Floor Tunnel

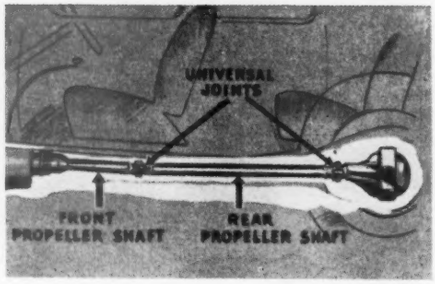
● Pontiac enters the field in 1937 with two lines of cars, the deluxe 6 and 8. The master six models, produced in 1935 and 1936 with conventional front springs, have been discontinued, so that the Pontiac now offers only independently sprung front wheels.

The independent front springs of the enclosed Dubonnet type used in 1936, have been replaced by the open type front wheel knee action units as used by Cadillac and LaSalle.

Wheelbases are five inches longer, being 117 for the six and 122 for the eight, while overall lengths are 193 and 198 inches respectively. Pontiac for 1937 boasts a new all-steel Fisher body, including frame, panels, floor, roof, and doors. Only the luggage shelf is of wood. One of the reasons for increasing the wheelbases was to move the rear axles 6 inches back with respect to the rear seats, thus placing rear seat passengers well forward of the rear wheels.

Pontiac frowns on the hypoid rear axle as a means of eliminating the tunnel in the car floor. Instead, this tunnel is eliminated by slanting the floor and by the use of a two-part propeller shaft. The forward half of this dual shaft is integral with and supported entirely by the transmission. Connecting the front propeller shaft with the rear axle is a short shaft with needle bearing universal joints at each end.

A sliding coupling at the rear of the transmission to absorb the slip of the propeller shaft makes slip joints in the universals unnecessary. By thus shortening the movable parts of the propeller shaft, its arc of movement occurs under the body kick-up where no tunnels are required for clearance.



The two-part propeller shaft, used on the 1937 Pontiac. This design eliminates the necessity of a floor tunnel in the body without resorting to the hypoid gear construction

A change has been made in the steering mechanism. It is now of a center control design, and the pitman arm shaft is straddle mounted with a bearing on either side of the worm instead of on one side only as before.

Increased piston displacement on the 1937 Pontiac engines has increased power, torque, speed, and acceleration. On the six, the displacement has been increased from 208 to 223 cubic inches, and the eight has been expanded from 232 to 249 cubic inches. Brake horsepowers have increased from 81 to 85 on the six and from 87 to 100 on the eight. Standard compression ratios are 6.2 to 1.

A slight change in the steel riser portion of the intake manifold is given as the chief factor in a more uniform distribution of fuel, lower vapor richness and more efficient combustion. This also reduces the variation in gas distribution between cylinders.

To offset the increased cooling problem arising from larger engines and higher speeds, the water pump has been redesigned. The impeller has been increased a half inch in diameter, and the front bushing used last year has been replaced with a needle bearing sealed at both ends.

Chassis lubricant is required every 1000 miles at four inner points of the lower control arm pivot shaft on the front end suspension. These points are reached from the bottom. The two lower control arm pivot pins each have one lubrication fitting. The upper control arm pivot pins each have two pressure gun fittings, as do the king pins.

THE center control steering mechanism has two tie rods, extending from the center outward. Each end of both rods has a lubrication fitting, as well as each end of the drag link. A new fitting is found on the intermediate steering arm which connects the two inner ends of the tie rods. All the above mentioned points require a chassis lubricant every 1000 miles.

Except for crankcase capacities, all lubrication specifications and capacities are identical for the Pontiac 6 and 8.

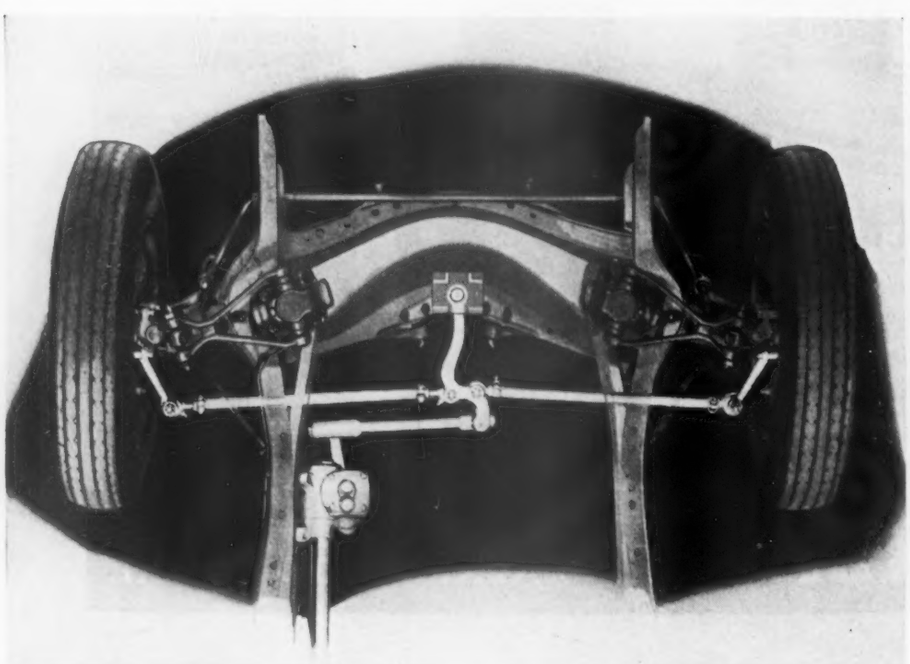
On 1937 production before Jan. 1 the front water pump bearing had a lubrication fitting taking a chassis lubricant, and the rear pump bearing is fitted with an oil cup which takes a light engine oil. Both are 1000-mile points. On 1937 Pontiacs produced after Jan. 1 the water pump bearings are packed at the factory and require no further lubrication attention.

The distributor shaft takes a No. 2½ cup grease every 1000 miles, instead of a chassis lubricant, as was recommended last year. Petroleum jelly is recommended for the distributor cam every 1000 miles.

The clutch release bearing is a graphite composition impregnated with oil and should require no lubrication. However, the bearing collar has a pressure fitting which can be used to lubricate the bearing should it become dry in service. The fitting can be reached by removing the clutch housing bottom cover.

Specifications for the rear axle and transmission remain the same, with SAE 160 for summer and SAE 90 for winter. The lubricant level at these two points is to be checked every 1000 miles, instead of 2000 miles as before. If extreme pressure or hypoid gear lubricants are used it is recommended that the grade and directions of the lubricant supplier be closely adhered to. A drain and refill are recommended twice a year.

On the carburetor, it is recommended that the dust cover be removed and



Front end of the 1937 Pontiac, showing the new center point control and cross steering mechanism

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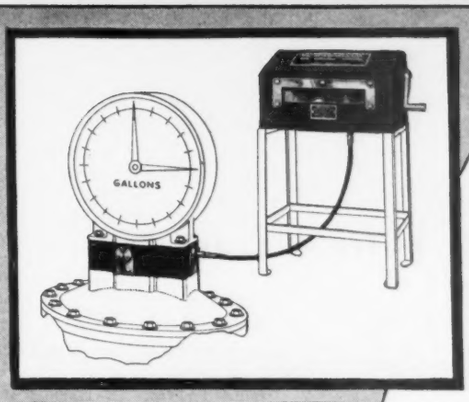

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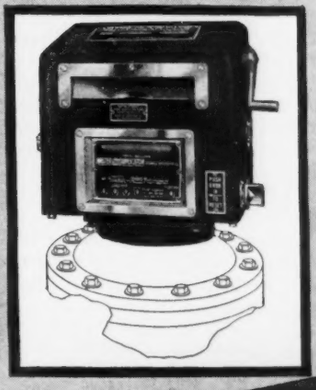

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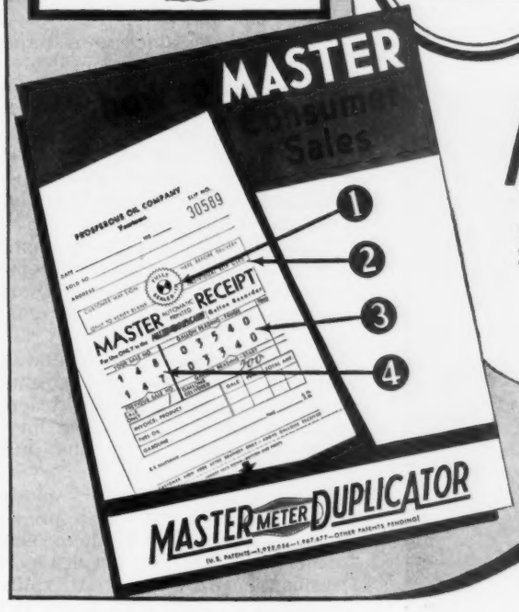

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graphite grease applied through the crew hole to the pump arm countershaft twice a year, or every 10,000 miles. It is also recommended that the speedometer drive cable be disconnected at the meter end and a few drops of engine oil applied to the upper end of the cable twice a year. These were formerly 5000-mile points.

The new type shock absorbers each take 6½ ounces of shock absorber fluid. They should be checked twice a year and filled to the exact capacity if necessary. Damage to the shock absorbers will result if an excessive quantity of fluid is used.

Front wheel bearings, another 'twice a year' servicing job, should be thoroughly cleaned, and balls and races coated with a No. 2½ cup lubricant or special wheel bearing lubricant.

Crankcase oil specifications remain the same as last year, ranging from an SAE 30 for hot weather, down to 10-W plus 10 per cent kerosine for sub-zero operation. For the 1000-mile, break-in period, 10-W is recommended.

Pontiac suggests that the crankcase be drained and refilled "when experience indicates the oil no longer possesses good lubricating qualities." However, it is further advised that, under ordinary driving conditions, "every 2000 miles will be about right for an oil change."

Universal joints are packed at the factory with sufficient lubricant to last for 30,000 miles.

Crankcase capacities remain the same, with 6 quarts for the six, and 7 quarts for the eight. The rear axle capacity has been decreased from 4½ to 3 pints, while the transmission remains at 1¾ pints. The capacity of the cooling system on the eight has been increased from 17 to 19 quarts, and on the six from 15 to 16 quarts. The capacity of the gasoline tank is 18 gallons on both models. Formerly it was 18 on the eight and 15 on the six.

STUDEBAKER

Filter Permits Oil Change Only Twice a Year

● Studebaker 1937 models bear the same titles as formerly, the President 8, and the Dictator 6.

Oil companies will find particular interest in the recommendation for changing engine oil in the 1937 Studebakers. A Fram oil cleaner, standard on all models, has a cartridge containing tightly compressed cotton waste, and if the cartridge is renewed according to instructions given on the dip-stick, "no Studebaker crankcase need be drained more than twice a year—once for winter grade and once for hot weather oil." It is further specified that between drains the only new oil required is that consumed in normal engine operation.

On the Studebaker dip-stick is inscribed the word "clean," and the car owner is told it is not necessary to replace the filter cartridge until the oil becomes so dirty that the word can no longer be seen through the oil film on the stick.

Engine oil specifications remain the same as last year, with an SAE 10 required for temperatures below 10 degrees F., SAE 20 between 10 and 45 degrees, SAE 30 between 45 and 90 degrees, and an SAE 40 for temperatures over 90 degrees F.

The crankcase capacity on the President remains 8 quarts. On the Dictator, the capacity is reduced from 6 to 5½ quarts.

The Fram oil filter, standard on all Studebaker models, makes crankcase oil changes necessary only twice a year, according to Studebaker recommendations

Studebaker goes to hypoid rear axles on all 1937 models. Instructions for servicing state that Studebaker hypoid rear axle lubricant is recommended and can be obtained from the Studebaker dealer. It is also recommended that the car dealer be consulted for lubrication of the steering gear, where a "very heavy fluid lubricant" is required. A hypoid lubricant, of course, is required for the rear axle.

On the President model, the rear axle capacity has been reduced from 4 to 3½ pints, and on the Dictator this capacity is now 3 pints, an increase of one half pint over last year.

A NEW automatic overdrive transmission is offered on the President model for 1937, and on the Dictator free wheeling and overdrive transmission is available similar to last year's model. The above transmission equipment is optional on the models mentioned.

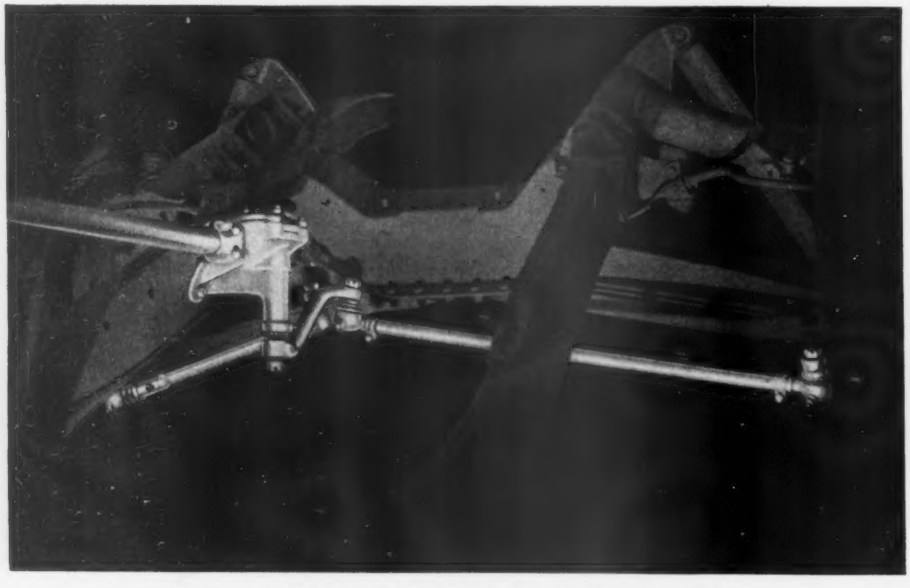
Transmission lubrication requirements remain the same as for 1936, with an SAE 70 engine oil being required for summer and an SAE 50 for winter. It is emphasized that only a straight mineral oil should be used, and that "under no circumstances should extreme pressure lubricants such as, leaded, sulphurized or chlorinated oils be used."

Transmission capacities remain the same as last year, with one exception. The capacity on the President, with overdrive, has been reduced from 7 pints to 4½ pints.

A new type of rubber insulated universal point is used on the Dictator models, which eliminates any lubrication service at these points. The spline on the Dictator propeller shaft has also been eliminated.

The two universal joints on the President model each require a pressure gun lubricant every 10,000 miles. These were formerly a 2500-mile service point. The President's propeller shaft spline takes a pressure gun lubricant every 1000 miles, instead of each 2500 miles as formerly.

The planar front wheel suspension is again offered as standard equipment on



Steering mechanism on the 1937 Studebaker President model

the President, and optional on the Dictator. This design offers no major lubrication changes over last year. The reach rod ball joints on cars having either planar or conventional front ends are now to be serviced with a pressure gun lubricant every 1000 miles, instead of 2500 miles as formerly.

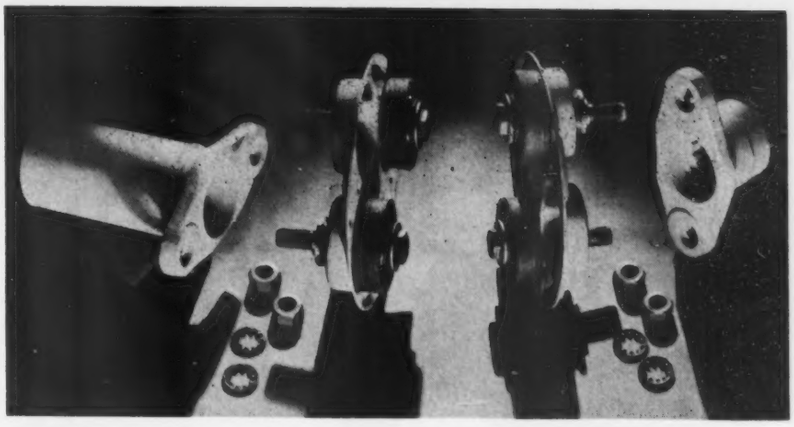
On the left reach rod of the President model there is a new point, an enclosed reach rod spring for absorbing steering shock. This point is to be serviced with a pressure gun lubricant every 1000 miles.

The water pump, which last year required servicing every 2500 miles, now is to be lubricated at 5000-mile intervals. Kasson's waterproof lubricant or its equivalent is specified.

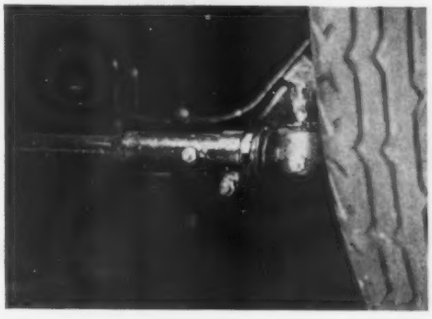
The clutch pedal linkage and the pedal shaft, requiring an SAE 110 gear lubricant and an SAE 20 engine oil respectively, are now 1000-mile points. The former was serviced every 5000 miles on 1936 models, and the latter was lubricated every 2500 miles. The parking brake linkage is now to be sprayed with oil every 1000 miles, instead of each 2500 miles. The parking brake lever is newly located just below the instrument panel to the left of the steering column.

Recommendations for 1937 state that the fan, formerly a 2500 mile point on the President, should be serviced every 5000 miles with an SAE 20 engine oil. On the Dictator models the fan is again serviced every 1000 miles with a pressure gun lubricant.

Front and rear wheel bearings are recommended for servicing every 10,000 miles with a high melting point, wheel bearing lubricant. Spring shackles and spring bolts are to be lubricated every 1000 miles with an SAE 110 gear lubricant.



The Studebaker Dictator is equipped with rubber insulated universal joints, requiring no lubrication attention.



An enclosed reach rod spring, a new point on the Studebaker President model, is used to absorb steering shock. This point takes a chassis lubricant every 1000 miles. It is located on the right side. (Photo-Chek Service, Chicago)

The cooling system capacities on both models have been reduced by one quart, that on the President is now 16 quarts, and that on the Dictator 13 quarts. The radiator fill pipe is located under the hood. A turn of the dummy radiator ornament unlocks the new one-piece hood which lifts from the front. The side panels of the hood are held in place by an interior latch of the type used on the conventional hood, and can be instantly removed for access to either side of the engine.

The automatic "Hillholder," introduced by Studebaker last year, will be continued on all models for 1937. This unit is located beneath the floor boards with an opening provided for filling the master cylinder. Its purpose is to prevent the car from backing up when it is temporarily stopped on a hill, and operates only when the car is going up hill.

WILLYS

Engine Servicing Simplified by Lift-Top Hood

● Probably the most radical change in appearance among the 1937 cars is to be found in the new Willys. The all steel body is longer and wider, and the tread has been increased from 51 inches to the so-called "standard tread" of 56 inches.

The one-piece hood, including louvres at the front to serve as a radiator grille, is hinged at the rear and lifts from the front, offering easy access to all parts of the engine. The battery is located under the hood.

The mechanical features of the 4 cylinder engine have not been materially changed from 1936. The engine has a bore of 3⅛ inches and a stroke of 4¾ inches, and develops 48 horsepower at 3200 rpm. A feature of the Willys engine is a new variable type venturi carburetor giving constant velocity around the main jet, providing smoother engine performance and uniform mixture. An adjustable main jet for altitude and climatic changes is included.

The Willys pedal shaft, which formerly took an engine oil, now is lubricated every 500 miles through two fittings with a semi-fluid gear oil. (Photo-Chek Service, Chicago)

A new type Gemmer steering gear has replaced the old one. The front axle spindle bolts have been made larger to lengthen the bushing life and to increase the factor of safety. The rear axle pinion shaft bearing is larger and the bearings have been placed farther apart to reduce bearing wear.

The brake and clutch pedals are provided with lubricators to prevent sticking of the shaft and the clutch release bearing is of the self-lubricating type and requires no lubrication during the life of the car.

The main gasoline line from the tank at the rear is now mounted on the inside of the frame channel to provide additional protection, and it is also located on the opposite side from the exhaust line and muffler so that cool fuel is delivered to the fuel pump.

To improve riding qualities, the springs have been lengthened and airplane type, two-way shock absorbers have been

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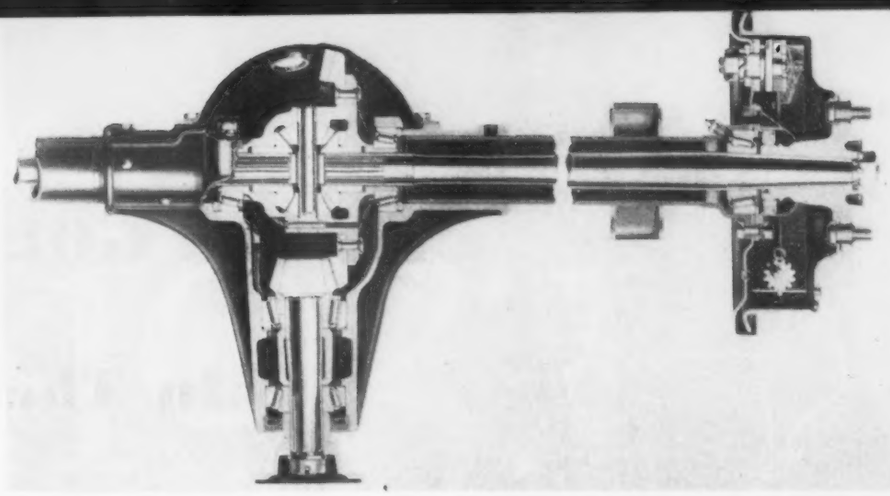
With the exceptions of the clutch throwout bearing, which now requires no lubrication, and the clutch and brake pedal shaft which now takes a semi-fluid gear oil every 500 miles, there are no lubrication changes on the 1937 Willys. A semi-fluid gear oil is recommended for the chassis points, wheel bearing lubricant for the front and rear wheel bearings, gear oil for the transmission, differential, and steering gear, engine oil for the engine and oilers, and a fibre grease for the universal joints.

The chassis points are to be lubricated every 500 miles, as are the starter, generator, distributor, fan, and water pump. The crankcase is to be drained and refilled every 1000 miles, and the transmission and differential are to be given attention every 3000 miles. Front wheel bearings are also to be lubricated every 3000 miles, as are the universal joints.

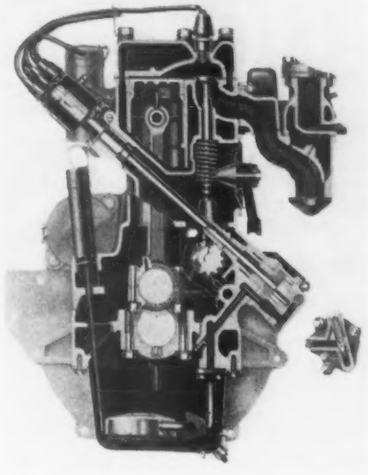
The transmission takes 1¼ pints, and it is recommended that an SAE 90 lubricant be used in winter and an SAE 160 for summer. The rear axle, also with a 1¼-pint capacity, is to be lubricated with an SAE 190 lubricant for summer and an SAE 150 for winter, according to factory recommendations, although common practice during 1936 was to use an SAE 160 and 90 for this point.

The crankcase capacity is 4 quarts. Engine oil specifications call for an SAE 30 for summer temperatures above 40 degrees; a 20-W during winter between temperatures of 15 and 40 degrees; and a 10-W oil for extreme cold weather.

The capacity of the cooling system has been increased from 9 to 11 quarts.



Pinion shaft bearings in the Willys rear axle have been spaced farther apart and increased in size to provide greater stability to the shaft and to increase bearing life



Cross-section view of the 48 horsepower Willys engine

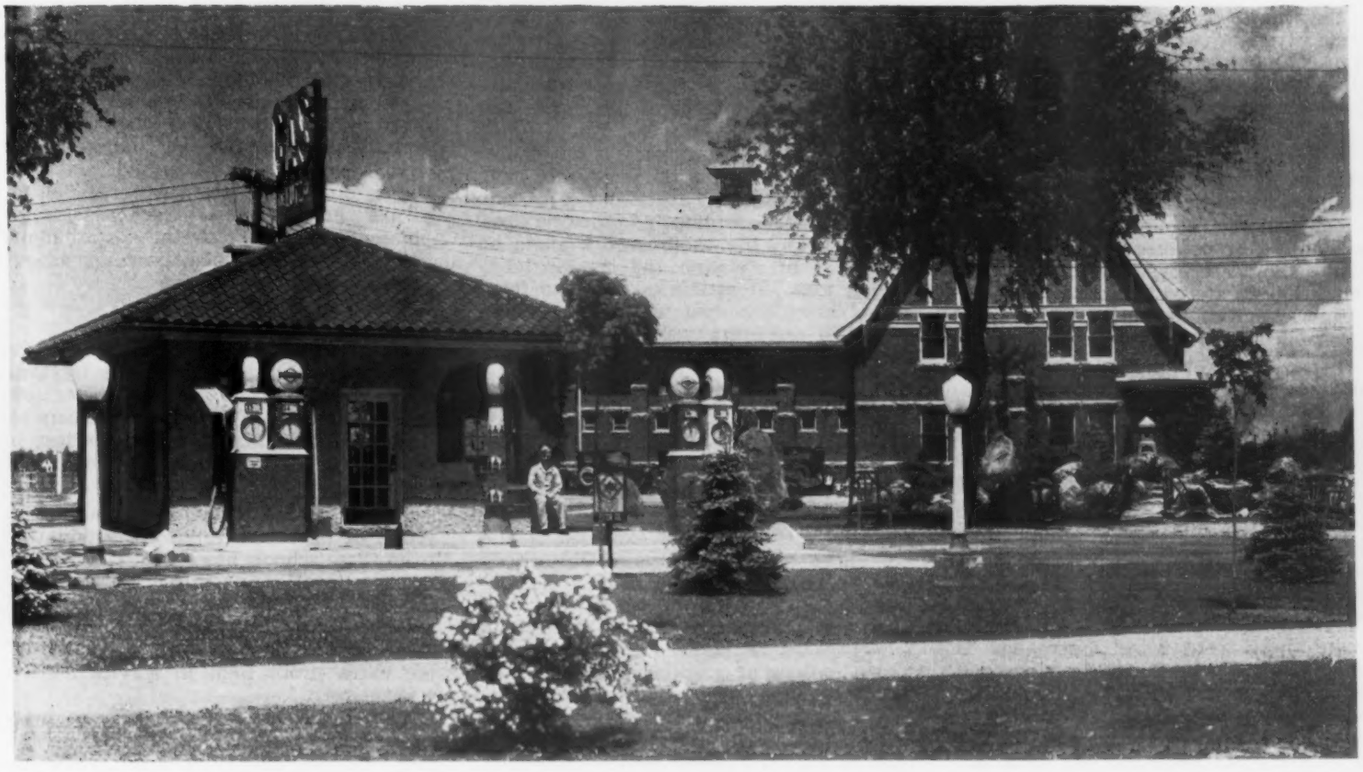
A Load of Taxes

The average Pure Oil Co. marketing tank truck carried enough gasoline in 1935 to produce state and federal gasoline taxes totaling $48,959.60, according to a company statement.

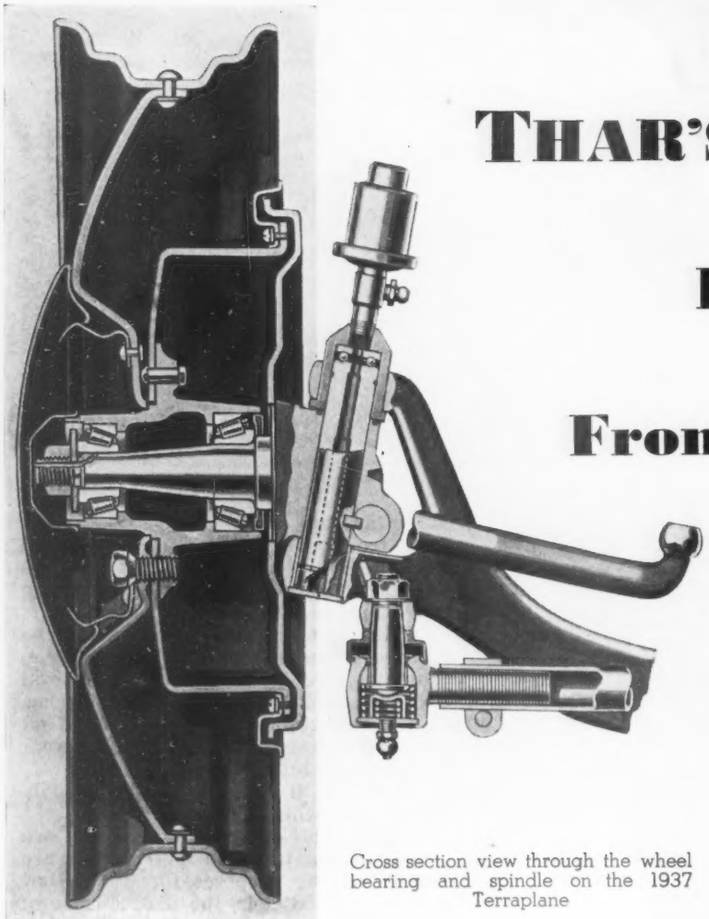
Of this total, it was shown that the state of Minnesota, which was used as an example, received $37,340. The federal tax then added $12,480 to the burden. Then the taxes on the gasoline and oil which the truck used during the year amounted to $139.60.

The Pure Oil News, a company publication, comments as follows:

"Reasonable state gasoline taxes are not obnoxious, provided the revenues are devoted to the purposes for which they are intended, that is, the maintenance of good highways, but all of us should object to the taxing of a particular class, the motorists, to care for general expenditures of state or federal governments."



A service station on the outskirts of Oshkosh, Wis., that attracts many tourist customers. The spacious lot has been landscaped with a pool, rocks, bridge, flowers, and seats. There is a large lawn between the highway and the sidewalk, and between the sidewalk and the station drives. The station belongs to the Lutz Co.



Cross section view through the wheel bearing and spindle on the 1937 Terraplane

THAR'S GOLD, PARDNER.

In Them Thar Front Wheel Bearings

By JACK N. WESTSMITH
N. P. N. Staff Writer

IF A service station operator could make an additional profit of $2.40 every hour he was on the job, he would be well on the way to become one of these "economic royalists" we hear so much about. Even if he netted only that much for one hour's work out of each day, over and above his present profit, he would have a sizable contribution toward the rent or utilities.

Yet many station managers are passing up an "extra" profit item that is right in their hands. Through ignorance of the possibilities, or because of lack of application, they are overlooking the real money maker offered in front wheel bearing lubrication of the modern high-speed automobile.

An experienced man can clean and repack both wheels on most cars in 20 minutes and make a profit of not less than 80 cents. This is on the basis of a charge of $1 for the job. Many service stations get $1 for this service on the smaller cars, such as Fords, Chevrolets, and Plymouths, and upward of $1.50 on larger vehicles. The cost for labor and material is placed at between 10 and 15 cents a wheel by experienced operators.

In addition to the profit from lubrication of these front wheel assemblies, is the opportunity to sell new bearings and "races" at a profit of 25 per cent. Stations making a good showing in front wheel lubrication find that one bearing out of every six inspected will show excessive wear or even complete breakdown from lack of attention or because of improper lubrication. It is no job at all to sell new parts if the customer can see the actual result of wear.

Of course the number of opportunities presented to repack front wheel assemblies will be in direct relation to the amount of other business done by the station. The ratio set up by one marketing company might be of interest in this connection.

So that the station operator may know whether he is getting the maximum number of wheel packs from the cars coming to him for gasoline and other services, this company has established a quota on the basis of gasoline and chassis lubrication jobs. It estimates that one front wheel assembly—two wheels—should be repacked for every 450 gallons of gasoline sold, or one for every 7 "lube" jobs.

That is, a station doing 10,000 gallons of gasoline business a month should repack approximately 22 front wheel assemblies. If the chassis lubrication services number 250 a month, the station should service the front wheels on 36 cars.

These ratios may be exceeded if the personnel of a station is really wheel-pack conscious. One Richfield Oil Co. station in Los Angeles, leased by an alert operator, averages between 35 and 40 wheel packs a month. He sells about 22,000 gallons of gasoline and lubricates the chassis on approximately 200 cars in the same period.

The average charge in the west is well over $1 for each repack service, although this particular station is patronized by a large number of small cars where the minimum of $1 is charged. The operator makes enough to pay the cleaning bill on the uniforms of himself and assistants from the sale of new bearings and races.

While the additional profit to be realized in repacking front wheels can be made really worth while, the fact that the operator is able to perform this service helps to impress the car owner. Too often the automotive dealer has used with considerable effectiveness the argument that the service station did not have the equipment or trained personnel for proper lubrication of the chassis and pointed to the fact that the station did not repack front wheel bearings as evidence of this incompetence.

INCREASED stress has been placed on front wheel lubrication service by California marketing companies as they found the wedge afforded automobile dealers by this argument often resulted in a loss in sales of other lubrication services and of accessories.

Training schools and personal supervision of operators following graduation from these schools has reflected a marked increase in all-round sales. Selling talks for use in approaching a customer and aid in building displays have combined to make the station operator conscious of the extra profit item in service station management.

A lubrication instructor for one marketing company was talking about the need for, and the extra profit value in, front wheel bearing lubrication. This man, a salesman-engineer, has the responsibility for increasing lubrication sales

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Steps in Servicing Front Wheel Bearings

Seated on a wooden box, part of the wheel-pack equipment at C. W. Coffey's Texaco Certified Station in Los Angeles, the lubrication man takes off the adjustment nut preparatory to packing the front bearings on this car. Note the protective cover on the fender.

Looking at the outer bearing for wear before the wheel is removed.

Using a wooden hammer handle the operator is knocking out the grease retainer, which holds the inner bearing in place. The pressure is applied through the hub from the outside.

A wheel packer is used to force new grease into the bearing.

at some 340 retail outlets lease-operated by the company in southern California.

As he spoke about the traffic load carried by the wheel bearings and stressed the importance of proper lubrication and adjustment, he pulled an outer bearing of a front wheel assembly from his pocket with the remark: "Here is a good example of insufficient or improper lubrication. This came from a car that had been driven less than 5000 miles. You can see how the "balls" have been burned blue by comparing them with this new bearing."

This is typical of the sales approach being successfully used in building up the "extra profit" or "plus" sales of the service station lubrication department.

Display is an important aid in selling wheel repacks. Here the ingenuity of the station manager can have full play. A very satisfactory display consists of a number of broken or worn bearings and "races." These are fastened to a stand rack and placed convenient to the lift or pump islands.

IF the customer's car is on the lift for lubrication of the chassis or for any other service, the operator-salesman can open his approach to a sale by taking hold of the top or bottom of the tire on one of the front wheels and testing the bearing for end play. This action should be accompanied with the query as to how long since the wheel bearings had been packed.

Most wheels that have been driven more than 5000 or 6000 miles without attention to the bearings will have definite play. Recommendations for front bearing lubrication vary between 5000 and 10,000 miles on most cars, and frequent inspection on cars more than two or three years old is recommended.

The customer's attention should be drawn to the importance of proper and periodic lubrication and adjustment of front wheel bearings as a safety aid, and the suggestion can be made that, while the car is on the lift, it would be a good plan to inspect these important parts for evidence of wear.

A semi-technical discussion of the action and stress on wheel bearings will often impress the customer. One company provides its station operators with the following information for use in their sales talks:

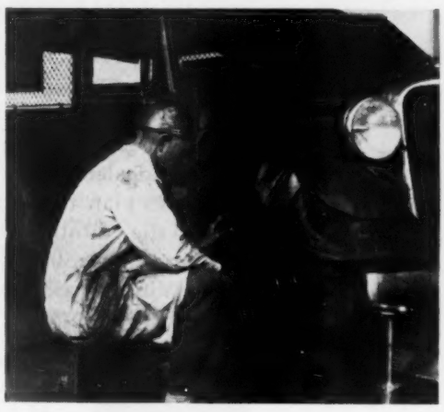
"When a car is being driven on a level highway, about one fourth the total weight is carried by each front wheel, which is turning at about one quarter engine speed. The rollers or balls are rolling on hardened steel 'races', lubricated with a special type of fibrous lubricant, and a condition of 'static' loading exists.

"Whenever an obstruction or hole is struck, the wheel is suddenly jerked—and what engineers describe as a 'shock load' is applied. This load is many times more severe than the 'static' load.

"In addition, when a turn is made at high speed, one of the two bearings is forced to take 'end thrust'.

When the bearing is full of the new grease, the old lubricant stands out from the edge in the shape of petals on a flower. In this way the operator can see that each roller or ball has been reached.

Here the operator is tapping the grease retainer into place, using the wooden handle.

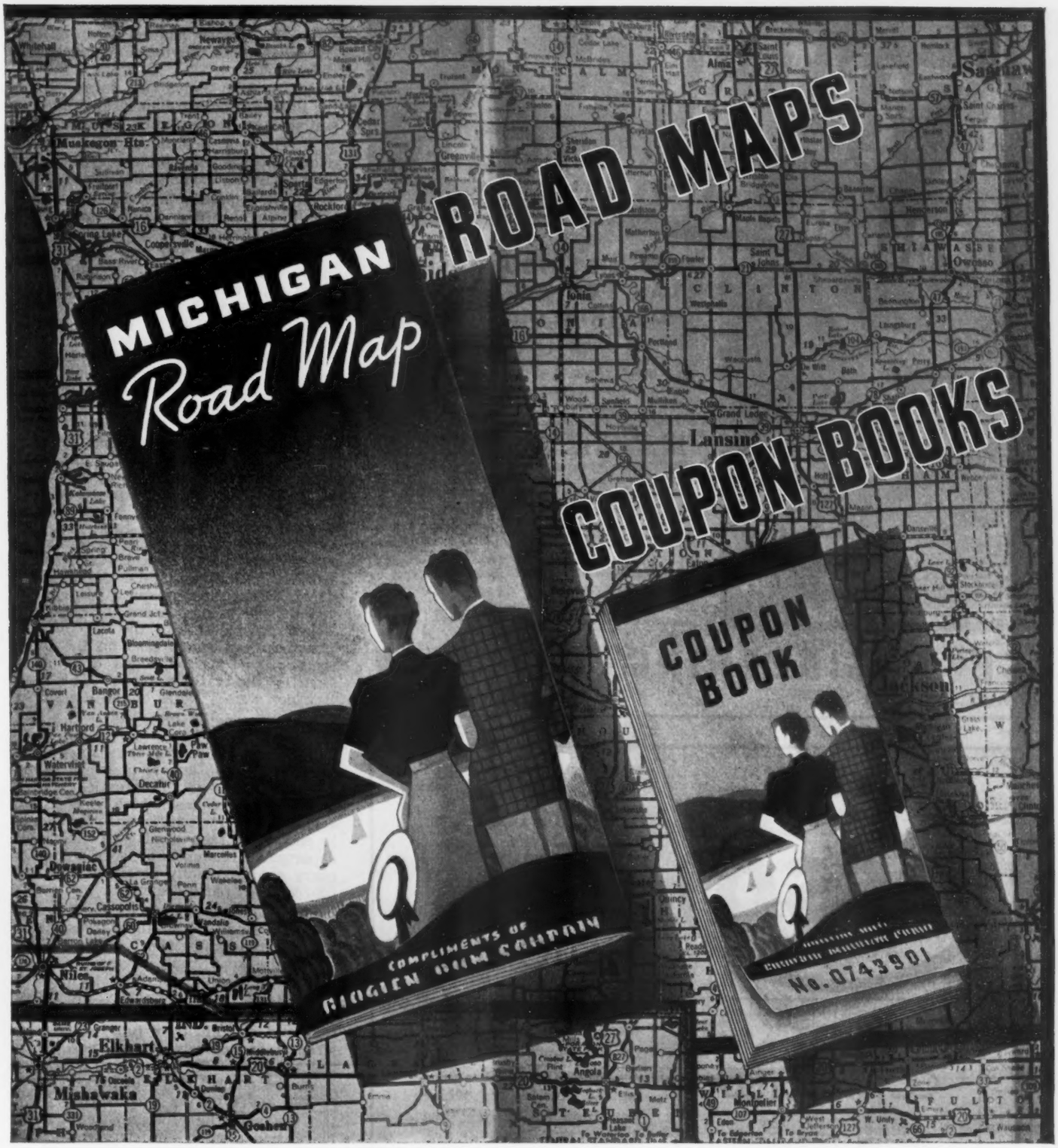


Completing the job. The adjustment nut has been drawn tight and the operator is spinning the wheel to see that the adjustment is right before putting in the cotter pin.

"A grease, in order to lubricate properly, must keep the highly polished, hardened metal surfaces moist with oil, but must not melt easily and thus be thrown aside where it can no longer supply the needed lubrication. As car speed increases, the bearing becomes warmer, heating the grease which then releases more oil for lubrication."

This company then suggests several reasons to be advanced by the operator in recommending front wheel repacking at 5000-mile intervals.

1. All worn metal particles will be re-



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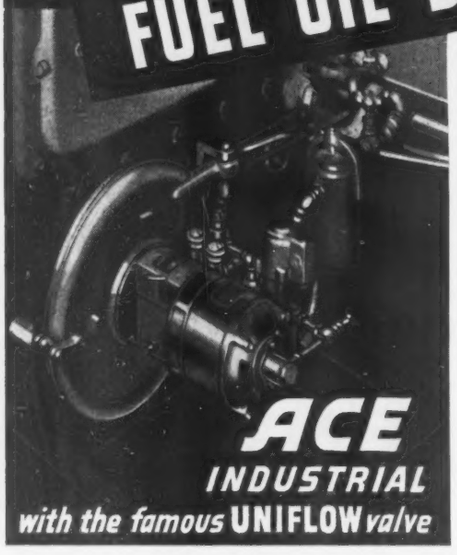

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moved, preventing further wear.

2. The grease has released much of its oil by then, leaving a relatively poor lubricant.

3. An inspection of the Races, Rollers or Balls can be made to insure continued satisfactory mechanical operation.

4. The felt grease retainers may be cleaned or replaced in order to prevent grease from reaching the brake lining.

5. An inspection of the brake lining and mechanism may disclose the need for mechanical repairs or relining.

A variation of the "old bearing" display could contain a can of used grease from a previous wheel pack. If a job is selected where there has been considerable wear, it will be possible to see flakes of metal in the grease. It is a good selling point to show this sample to the prospective wheel-pack customer. One operator included a low-power magnifying glass for demonstrating the presence of metal particles. While showing the sample, the operator can make the point that these abrasive particles, in effect make the grease a grinding compound and greatly accelerate wear.

WINDOW displays can be extremely effective in selling wheel packs to the gasoline customer at the pump island. Worn wheel bearings and a pan containing the old grease in one instance were placed on one side of the window with new bearings and grease on the other. Appropriate printed signs drew attention to the various items. The worn bearings were: "Notes of the Road", and the entire display was captioned: "Both Sides of the Story".

This display also included a worn transmission gear as an argument in selling transmission and differential grease changes. Gears from both these units can often be included with effectiveness in the stand rack display in the "lube" department. Examples of worn or broken gears can be readily obtained from the nearest used parts dealer.

Still another sales story can be woven around a small can of the fibrous grease used in repacking wheel bearings. This should be kept easily accessible at the pump island and at the lift. The operator can take a small amount of the grease between the thumb and forefinger of his hand and illustrate how much more strength and adhesiveness the new grease has than the old. These characteristics, it can be pointed out, will prevent channelling and throwing when in use.

A study of the procedure followed by lubrication men in servicing wheel bearings convinced one marketing company that in many cases there was a complete lack of planning and organization in doing the work. Some practices observed were not only dangerous to the operator, but resulted in unsatisfactory results to the car owner.

While no inordinate amount of skill is required, the operator has to know what he is doing all the time. Especially is this true when adjusting the bearings on completion of the job.

An approved procedure for repacking front wheel bearings, as issued to the operators by one Pacific Coast oil company follows:

1. Lift the front wheels off the ground.

2. Remove the hub cap, cotter pin and lock nut.

3. Remove keyed washer. Place all of these items in a neat row in their proper order on a piece of clean paper —preferably a paper towel.

4. Remove outer bearing with the inner race and cage.

5. Gently pull off entire wheel. Then, using the wooden handle of a hammer, tap out the larger inner bearing through from the inside of the hub. This will also force out the grease retainer, which should be noted as to its arrangement. (Note: In some makes of cars the grease retainer is held in place by a spring clip. This should be removed before attempting to remove the bearing.)

6. Inspect all parts removed and the two races remaining inside the hub for general appearance of lubricant, broken balls or rollers, cracked races, bent or worn cage and discoloration caused by overheating.

7. Wipe off bearings with a paper towel or rag and wash in gasoline or kerosine. The object is to remove all traces of worn particles and grease which might stick to the inside of the cage. When air is used to "blow" the bearings clean, do not cause the bearings to spin—this is dangerous. Always blow air between the rollers so as to clean out the cage. When properly cleaned the inside race can be inspected.

8. Remove all old grease from the inside of the hub, being sure to leave no gasoline or kerosine on metal surfaces —these must be dry. Also wipe off the axle and grease collector ring.

9. Remove all old grease from grease retainer, and squeeze out the felt as much as possible. Never place a metal inclosed, felt retainer in gasoline or kerosine. These fluids will soak into the felt, and when replaced, will wet the metal so that the grease will not stick to it.

10. After making sure both bearings are satisfactory, and are thoroughly dry, as are the operator's hands, repack these bearings either by hand or with a special bearing repacker, of which there are several varieties. The grease should fill all the open spaces between the rollers or balls and the race, and enough more should be placed on the outer surface so as to completely coat it.

11. Place the larger inner bearing in the wheel, and properly tap the grease retainer flush with the hub surface or until it seats against the inside shoulder. (Note: If the spring faster is used, care should be taken to see it is secure.)

12. Slide wheel over axle, and slip on outer bearing which has been packed in the same manner as the inner one. Care must be taken to see that the adjustable cone, or inner race, is in alignment with the bearing surfaces as it is pushed home. Particularly with New Departure Ball Bearings is it possible to get the bearing in at an angle with the adjustment cone and thereby damage it.

13. Place keyed washer over axle and screw on the nut, which should be pulled up snug with a 10-inch wrench so that all the end play is removed. The amount the nut is backed off varies with different cars. However. on a six-sided nut, one cotter key position back from a snug

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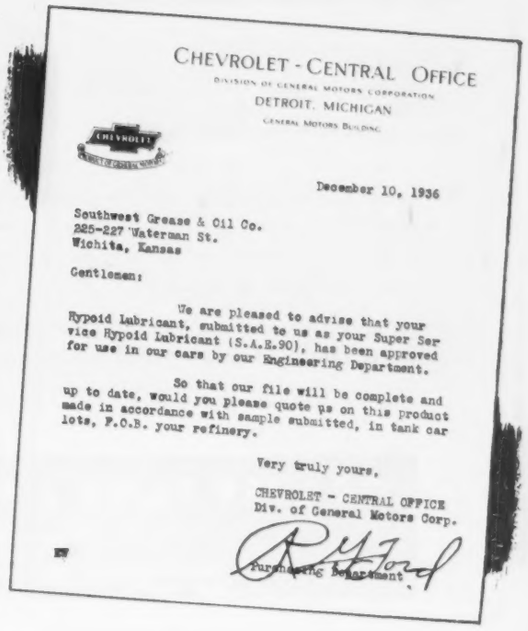
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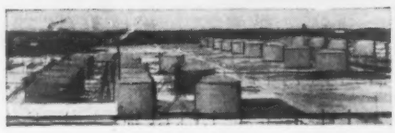

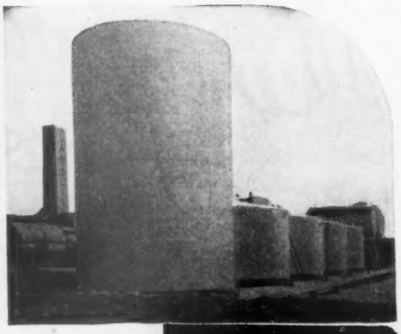

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fit is satisfactory, providing the wheel does not drag due to friction of the bearings. It is better to be slightly loose than tight.

14. After proper adjustment, replace the old cotter pin with a new one of the proper size and length. One end of this should be bent over the axle and the other over the nut.

15. Replace the drive-on type hub with a hammer, or screw on the threaded type, before snapping on the large nameplate hub cap. (No grease should be put in the inner hub cap—and of course not in the outer.)

Some variations of these suggested rules are given to meet the needs of certain cars.

CHEVROLET and other General Motor cars employ New Departure Ball Bearings and require a "free" but not loose adjustment. The Chevrolet Repair Manual describes this adjustment as follows:

"After the wheel has been replaced on the steering knuckle spindle, with the bearings and felt retainer in their proper location, install the spindle washer against the inner race of the outer bearing and screw up the retaining nut only tight enough to seat the parts. Back off the nut slowly until a slight shake is felt in the wheel, then screw up the nut until the next cotter pin slot in the nut lines up with the cotter pin hole in the spindle.

"The adjustment should then be such that the wheel will turn very freely, but with no perceptible looseness . . . Spin the wheel, making sure that all parts are in correct position, then insert cotter pin and clinch securely."

Several cars, including late models of Chevrolet. have static collectors on all four wheels. The static electrical charge built up by the rubber tires flexing on the highway affects radio reception unless it is rounded to the frame.

On the front wheels, a coiled spring is provided inside the drive-on hub cap. There is a brass cone tip fastened to the small end of the coil, which presses into the cone hole in the axle end. If squeaking occurs at this point, a small amount of vaseline should be applied.

The cotter pin must not be bent over the end of the axle, but must be bent around the flat face of the nut in order to clear the static collector. In replacing the drive-on hub cap, first place the large end of the coil spring inside the clean cap. Then position the brass collector tip in the axle cone hole and drive the cap on with a light hammer.

Particular care is necessary in servicing the front wheel bearings on the small Packards. The recommended procedure for doing this job starts with removal of the five hub bolts, which permits the disc wheel to be taken off. This exposes the dust and water shield rim, which is removed by loosening the single bolt and slipping it off. *Note* that there is a drain slot at the bottom of the rim, and the bolt is at the top, the screw driver slot facing forward.

Remove the cotter pin which passes through the axle but not through the nut. Unscrew the large, thin, outer nut. Before taking off the lock washer which has 8 holes in it, note the bearing adjustment for looseness or tightness.

Remove this washer, noting exact po-

sition of locking pin on outer nut, and which side, or face of washer is toward inner nut. (Reversing the washer splits the adjustment, permitting 16 positions as against 6 with a hexagonal nut and cotter pin hole.) Remainder of the service follows the procedure outlined above.

Upon completion of the job the bearings should be adjusted until the wheel turns freely, but with no appreciable end-play. Too tight an adjustment will overheat the bearings and cause leakage past the grease retainer. No extra grease is required inside the hub.

Grease retainers which have been driven in too hard against the inner bearing tear the edge of the cage holding the rollers and the broken or worn particles then cause damage. Damaged retainers should be replaced with new ones.

This in general covers the procedure in servicing front wheel bearings and, if the operator will observe the few precautionary measures suggested for adjustment, he will have no difficulty in adding this profitable service to his lubrication department.

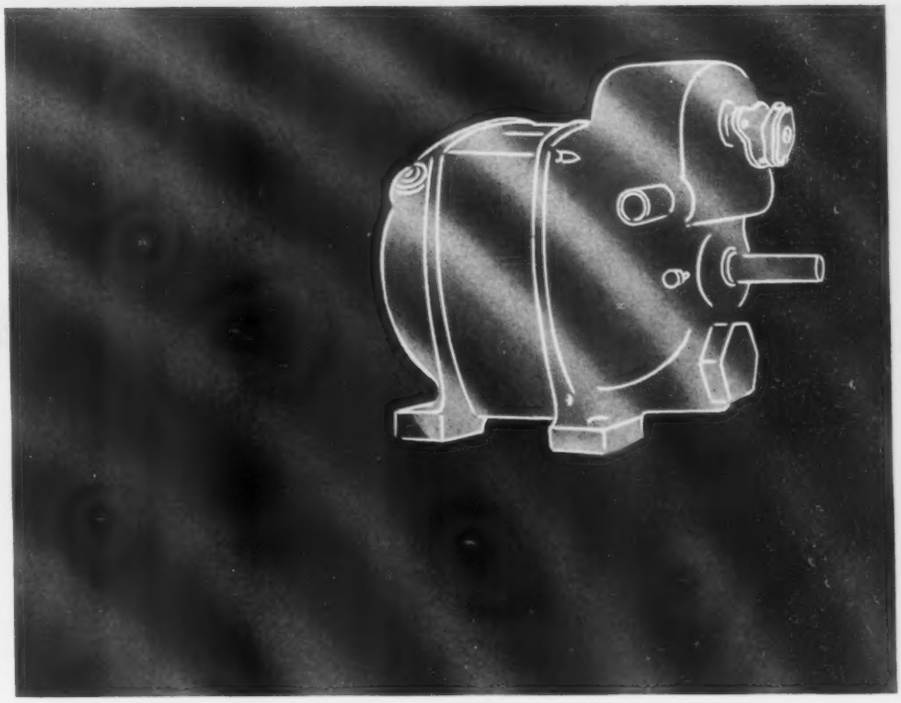
IN THE matter of tools and equipment for doing the job. The work will proceed much more efficiently if the tools to be used are contained in a separate box from other tools at the station. These should include a 10 or 12-inch wrench, two pair of pliers—one with wide adjustment and beak-nosed for temporary setting of the adjusting nut and one for removing stubborn cotter pins—, a lightweight hammer, a wooden hammer handle for driving out the grease retainer, and a 6 or 8-inch screw driver. A good assortment of new cotter pins can be kept in a can or cigar box.

Some operators find use for a small wooden box, about one foot square, to be used as a seat while working on the wheel. These boxes or cans will be attractive additions to the station equipment if painted and kept clean. A clean cloth or paper towel for laying out the various parts as they are removed will also prove helpful and will provide an easy check when it comes to reassembling the wheel bearings.

If a bearing packer is used, it should be kept with the other tools and equipment used in this service. Lacking a packer, the operator should take great care in seeing that the grease reaches well into the cleaned or new bearing. This will be facilitated if a quantity of grease is placed in the palm of one hand and the bearing face is pushed down and rotated into it. A very small quantity of light weight oil sprayed into the bearing before application of the grease will help its penetration. In no case should gasoline or kerosine be used for this purpose.

When the job is completed, the operator should be sure there are no parts left over, that both wheels roll freely—dragging brakes may effect this to some extent and should be called to the customer's attention—and finally, that surplus grease on the wheel or tires be wiped off.

If the service station operator will take average care in performing this job, he will add a nice profit item and will observe a steady increase in service sales of other departments.



JUST ONE POINT

There have been more Leland totally enclosed explosion-resisting motors sold to major oil companies and gasoline pump manufacturers in the last sixteen years than can be credited to all other manufacturers combined. May we have your inquiry?

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LELAND

THE AUTOMOTIVE ENGINEER Looks At Lubrication

By LEWIS K. MARSHALL†

IN this intensely interesting and thought-provoking article Mr. Marshall points out that there is a definite trend to the car dealer as an outlet for gasoline, oil, and lubrication service. More powerful and still more economical engines, greater rear axle tooth pressures, smaller transmission gears—these are some of the trends discussed in detail in this article.

IN A recent article on lubricating and servicing hypoid gears, a leading engineer in the petroleum industry stated, "That for the first time in automobile construction, a 'lubricant' has become a mechanical part designed to 'fit' ",*—a splendid expression of the position which lubricants have reached in our automobiles today.

Of course, this does not mean that a particular brand or make of oil is required, except under the most unusual circumstances. A satisfactory product can be made by many manufacturers, just as in the case of valves, piston rings, gaskets, and other working parts of the car. But today, more than ever before, both the oil and automotive industries should recognize that their products must be designed and manufactured to suit the service and mechanism in which they will be used.

In spite of the fact that this statement was made by an oil engineer, it does not appear to us in the automobile business that many of the other executives in the oil business understand its significance. From the point of view of the automobile man, the oil companies seem to have been inclined to sit back and say that their industry is the older—that automobiles could never have existed today if it were not for the general availability of fuels and lubricants produced by their industry—and that they themselves are the ones who really know all about their own products and how they should be used.

Oil executives have even said that automobile engineers should design their products to suit the lubricants available, and should not continually alter the designs to suit themselves and then expect the petroleum industry to provide a satisfactory lubricant. In general, they have seemed to hold themselves aloof from this automobile business in the past and have appeared reluctant to recognize that, after all, our customers dictate the changes that must be made, and that in reality both our industries are completely at the mercy of the buying public.

Automobile fuels and lubricants, of course, constitute only two of a vast number of highly specialized petroleum products, but we feel that no one can afford to overlook the fact that the oil industry would never have reached its present proportions without the automobile. Motor cars manufactured by a relatively small number of companies constitute the greatest single market for products of the petroleum refiners.

The automobile industry depends for its continued growth and development on building a product that will meet the economic demands of the people it serves. Progress in the development of these automotive products demands constant change. Our industry is not static; anyone who tries to make it so cannot survive—as has been demonstrated by the experience of at least one of the largest manufacturers.

IN THIS progress and change, it is essential for the petroleum industry to stay with us. Executives in the petroleum industry responsible for processes and equipment must realize by now how necessary it is to adjust themselves to this point of view and lay their plans accordingly.

No automobile man denies the enormous cost and investment that every oil company faces when it is necessary to distribute a new product and provide new equipment for dispensing it. On the other hand, the cost of plants and equipment for making yearly changes in the automobile itself is equally well known. Both are necessary to a continued healthy growth of our joint task of furnishing better automotive transportation. In the automobile business we recognize the necessity for such changes; we plan them, and plan to charge off the costs of such changes before it is time to make another one. Why shouldn't the oil industry do the same; and in planning equipment, design it with a view to providing elas-

Author's Preface

● In recent years various representatives of the petroleum industry have taken members of the automobile industry to task on several occasions, either publicly or privately, for changes in design which required lubricants the petroleum industry in general was not prepared to furnish readily.

Changes in the recent 1937 model cars have again brought this subject to the forefront. Although the general clamor from various producers of petroleum products has not yet been quite so evident as in one or two cases in the past, nevertheless it is well known that there has been no little discussion of the subject and many questions as to the real necessity for these changes.

This article has been prepared not as an answer to such criticism, but to present the point of view of one automobile man as to the part he believes the oil companies should play. He shows how a continued recurrence of these apparently difficult situations might be relieved through a systematic analysis of the trend in automobile design and greater co-operation in the future between automotive and petroleum engineers—(L. K. M.).

†General Service Manager, Pontiac Motor Division, General Motors Sales Corp., Pontiac, Mich.

*Automobile Trade Journal, A. L. Clayden, November, 1936.

ticity that will permit changes at relatively low expense?

At the same time it must be recognized that intelligent planning on the possible future requirements for equipment and products must depend, to a large degree, on the demands of the future designs in which they will be used.

"That's fine", says the oil man, "but as a result of competition in the automotive industry, no automobile company nor its engineering department will give out any information on future designs until the car is built and practically on the market. The best an oil company can hope to do is secure information sixty days ahead of announcement, and in most cases this time is reduced to from thirty days to one week."

But looking at the problem more closely, is this really true? Is there such a thing as real secrecy in design, insofar as the basic principles are concerned which control the fuels and lubricants required? Certain details, particularly appearance and equipment or the application of detailed designs to new uses, are secret and will always be kept that way as far as it is possible to do so in a big organization; but radical changes involving lubricants and fuels in general are a slow growth and not the product of some overnight invention. These trends we can see, and if we would be guided by them, there would be much less difficulty in providing fuels and lubricants well ahead of actual automotive requirements.

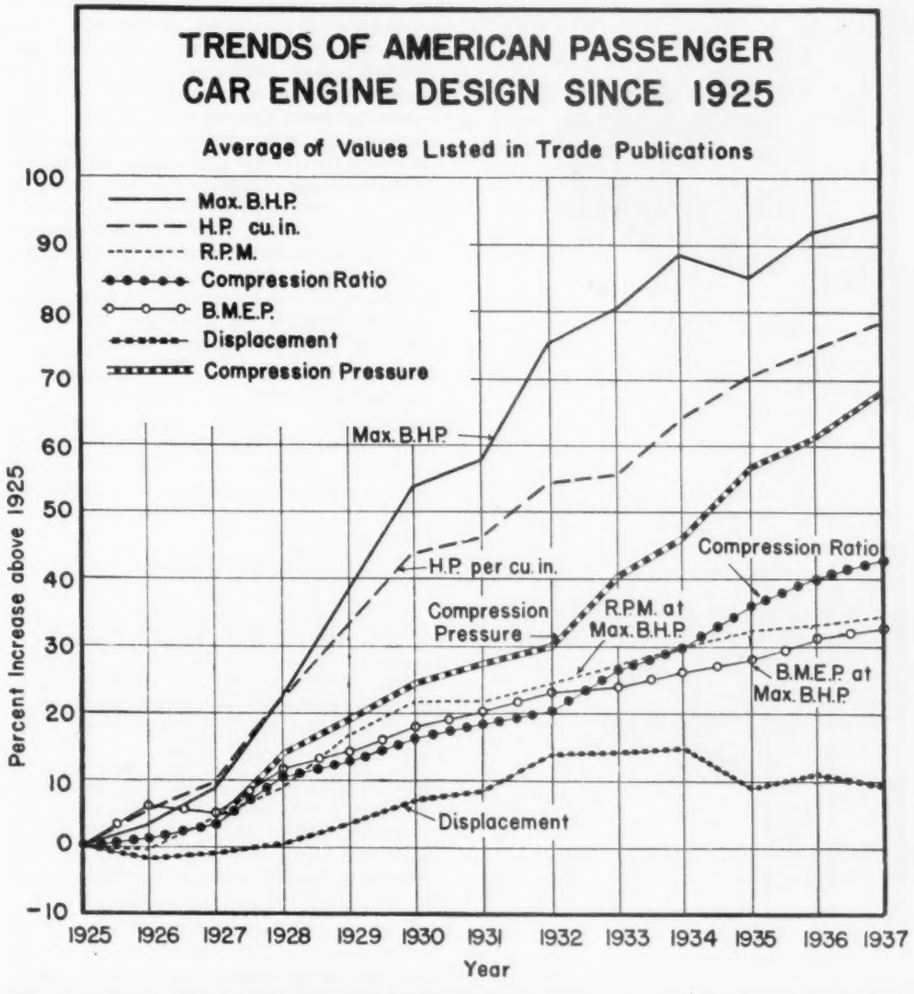
This same principle applies to the marketing and distribution of petroleum products. There is nothing in either the automobile or petroleum industry that is fixed. The very life and progress of the business depends on change. Changes in marketing procedures and methods of distribution are continuous, but, like changes in our products, they can be forecast with reasonable accuracy by giving careful attention to the history and the present requirements of the business.

The Future In Automobile Design

Let's look at a few examples . . .

Automobile engines are becoming continually more powerful and at the same time more economical.

This trend is clearly indicated by the curves in the illustration below. Economics of the automobile industry require better, more economical engines, at still lower cost. Obviously the only way this can be achieved is through higher specific output. Fuels and lubricants are now one of the most important barriers to further improvements in this respect. It is well known that if higher anti-knock value fuels were available, which would permit us to raise the compression ratio, we could build our engines smaller and make them still more economical.



Trends of American passenger car engine designs since 1925. Average of values listed in trade publications. Furnished by the Ethyl Gasoline Corp.

But such a fuel is not yet here at a price operators can afford to pay.

In the same way, engine fits are constantly being made closer. It is quite common today to fit pistons to a clearance of one and one-half thousandths, while six or ten years ago no piston was fitted to less than three or four thousandths. Close fitting of pistons, bearings and other working parts necessitates lubricants with a viscosity so low that the engine can be cranked and started readily in the coldest weather. Oils of 10-W and 20-W specifications have been produced by the petroleum industry to meet this requirement, but only on the insistence of automobile engineers and not before the industry already had been in production through one winter with cars that required them.

This trend toward engines requiring lighter lubricants was evident at least a year before these oils became absolutely necessary. Evidently it was seen by a few of those who were closely following the trends of automobile engine design because some such oils were available; but it was not recognized by the industry in general.

Since the introduction of engines requiring these oils, it has been definitely proved that an automobile engine can be broken in to use any viscosity oil desired. The heavier the oil, the larger the clearances established as the parts wear in. Actual experience in both engineering and commercial work has shown that on modern, closely fitted engines you can get just as much wear on pistons and other working parts in 10,000 to 15,000 miles using a heavy oil (S.A.E. 30 or 40), as takes place in 25,000 to 30,000 miles of operation when the engine is broken in and operated with light oils (10 or 10-W; 20 or 20-W). As a result, today hundreds of cars in fleet operation are run on the lightest possible lubricant that can be used in the working parts with economy.

Experience in the past few years has also shown that bearing loads and temperatures may be limited by engine oil. Recently several manufacturers used bearing materials which maintained their strength and hardness at considerably higher temperatures than possible with the conventional babbitt—only to find that some of the most highly refined oils reacted unfavorably with these materials under severe operating conditions, causing corrosion and developing excessive clearances in a relatively short time.

During the past two years wonderful strides have been made by the oil industry in co-operation with automobile engineers in developing oils to meet these requirements, and we believe it will not be long until the entire automotive industry will have bearings designed to take full advantage of them.

It is also well known that great progress has been made in the development of Diesel engines for automotive use, but one of the largest users of such engines has found only two oils which they consider as satisfactory for use in their products, and the requirements for the fuel as well as the lubricants are rigid in many respects.

What of the future? . . .

Engines of the conventional Otto cycle type are certainly getting smaller; specific outputs must go up. Operating temperatures are bound to increase; compres-

sion ratios will go up as fast as the fuel will allow; new bearing materials will permit loadings far above any of those found on present day engines; increased knowledge of metallurgy will permit closer fits of working parts. Fuels and lubricants will have to be provided to meet these new conditions.

Paralleling these changes in the conventional engines, even more rapid development is forecast for the Diesel cycle, especially for commercial use, since with present fuels the thermal efficiency of the Diesel is very much higher than is possible with the Otto cycle—especially at part load. General distribution of a satisfactory Diesel fuel will also be required.

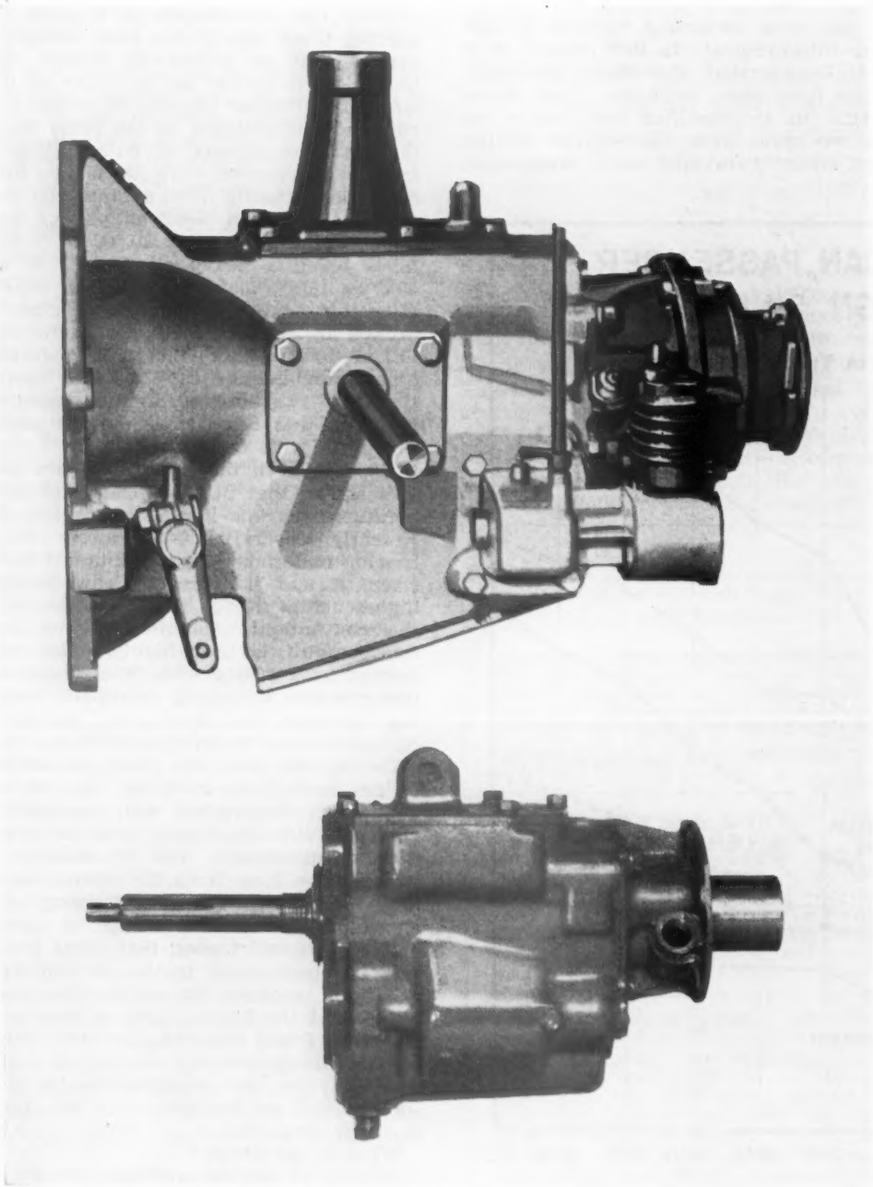
Of course, at this time conditions are such that it is impossible to make any definite prediction as to the future of the Diesel, and much will depend on the progress made by the oil industry itself.

Transmission

The rapid development and wonderful strides made in the engineering of automotive transmissions are frequently overlooked, but the progress here has been just as rapid as that made in engines, with which we are more familiar. Only a few years ago, the transmission for a car with an 85 horsepower engine weighed over 100 pounds; today the transmission for a car with a 100 horsepower engine weighs 65 pounds or less, and in addition to the case and gears included in the old design, the new transmission contains the many additional parts of the synchro-mesh mechanism to insure smooth, silent engagement.

Also, over-drives and automatic shifts are found on a number of current production cars. Lubricants for these modern transmissions must be lighter and, in certain cases for over-drive and free wheeling units, lubricants of the mild extreme pressure type may be required. The old thick "grease" is a thing of the past.

What do we see ahead? Certainly the weight of the transmission is not going up. Sizes of the gears will go down and tooth-loadings will increase as fast as the physical properties of the materials will permit. Automatic shifts require lubricants of low viscosity in cold weather. Automatic transmissions are also a possibility for the future. Lubrication requirements for these units will certainly demand another step along the lines already clearly indicated by the trend to synchro-mesh and automatic shifts.



Above—1927 transmission used with an 85 H.P. engine, weight 105 pounds. Below—1937 transmission used with a 100 H.P. engine, weight 63 pounds

Rear Axles

For several years the rear axle has been the limiting factor in lowering our cars. Some designers have even gone so far as to provide tunnels in the floor to allow clearance for the axle and propeller shaft. Improvements in materials and manufacturing practice have made possible smaller gears.

The 1937 Pontiac uses a two-piece propeller shaft and new spiral bevel rear axle gears which give the low floor without a tunnel and at the same time require no special lubricants. Conventional axles with other similar propeller shaft changes are also continued in a number of other cars.

For years, various manufacturers have worked on worm drives, with the worm below the axle, as a possible answer to the problem; but worm drives capable of handling the loads and speeds required for automotive service are not yet considered commercial. Today, the hypoid (half-way between the conventional spiral bevel and the worm) has found use on a number of volume production cars. With this comes the necessity for special lubricants which perform an entirely new function beyond that of providing a film between the working parts. To be assured of a lubricant that will perform this function properly, some car manufacturers have considered it necessary to distribute an approved E. P. lubricant through their own parts and service organization. In the majority of cases this is only a temporary measure and will be discontinued as soon as the petroleum industry makes satisfactory lubricants generally available across the country.

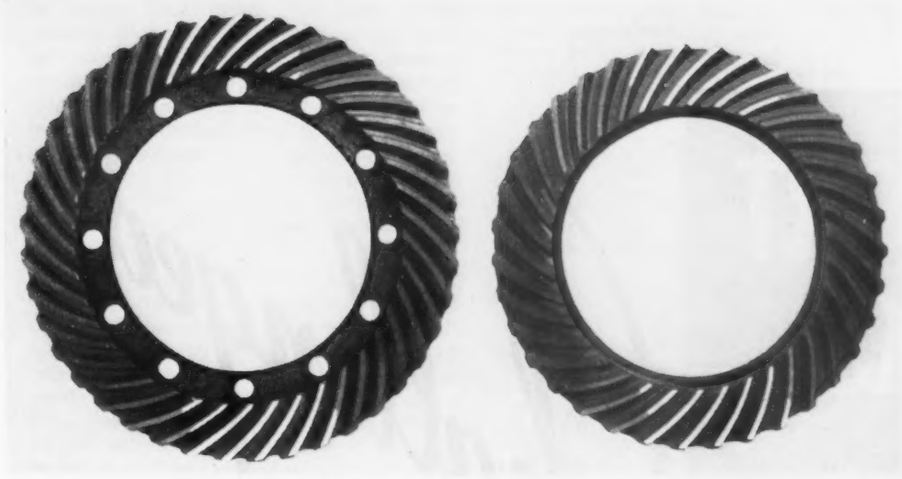
Unquestionably cars will be lower in the future. Operating conditions in the worm drive are even more severe than in the hypoid. There is no secret about the trend in this direction, and the oil industry must be prepared to meet it.

Accessories

Lubrication of automobile accessories (water pumps, distributors, generators, fans, etc.) is likewise showing a definite change. Today practically all these units are lubricated with a light lubricant, such as chassis lubricant or engine oil—and even lighter oils.

Improvements in water pump design are rapidly eliminating the necessity for a special water pump lubricant. Some 1937 cars have a pump packed at the factory, completely sealed and good for the life of the car.

While not so important from a product standpoint, it is necessary to recognize the requirements of these units—especially the one of providing light oil for bearings in generators and water



On the left is a 1928 Oakland rear axle ring gear, and on the right a 1937 Pontiac rear axle ring gear. Note the reduction in diameter, making possible a lower floor with the same road clearance

pumps that need it and making such a lubricant universally available in all seasons.

Classify Petroleum Products Simply

So much for the future from a technical standpoint. To be practical, economics and marketing policies must also enter the picture. Obviously there is a limit to meeting new lubrication requirements by adding another special lubricant to an already overloaded line of products. As a matter of fact, changes and improvements can be put into effect most readily only when the number of products handled is simplified to the extent that changes can be made quickly and economically without the necessity of scrapping or reworking large quantities of materials already in the hands of distributors and dealers.

Also, our products must be sold to Boake Carter's "Johnny Q. Public", and "Johnny Q." does not understand or take readily to "special" requirements. He has a violent dislike for anything that complicates the operation of his automobile.

Years ago a very difficult and confusing situation on oils and lubricants was simplified through the adoption of S.A.E. numbers. From the standpoint of the service man and the customers, the fuels and lubricants necessary to maintain an automobile must be kept so simple that they can be covered by just such designations as the present S.A.E. numbers or their equivalent, brought up to date in line with the requirements of our product.

And right in this connection we have a job to do today. The trend toward hypoid gears has been indicated for a long time. One manufacturer has used a hypoid rear axle for 13 years. But now that we have them in more general use, what do we find? There is no such thing as an official standard E. P. lubricant for hypoid gears. Some hypoid lubricants can be used satisfactorily in the rear axles of past model cars, but others may thicken in service and cannot be recommended for use in these cars.

Until the present confusion on hypoid lubricants is cleared up, we are required to warn our dealers and owners that you must not mix one hypoid lubricant with another, and you must not mix hypoid lubricants with the plain rear axle and transmission oil that we have had in the past. Hypoid lubricants must be drained and the unit completely refilled after 5000 to 6000 miles of operation.

Certainly simplification is in order in this case. Perhaps we will get by this next year without much trouble, but we will only do it through a continuous program of educating all our own employes and dealers' men, as well as the public. Until we get this job done, it is certain that both the automotive and petroleum industries are going to have trouble and expense, regardless of whether or not they make a hypoid lubricant or build a car with hypoid gears.

The Relation of the Automobile Dealer To the Marketing of Petroleum Products

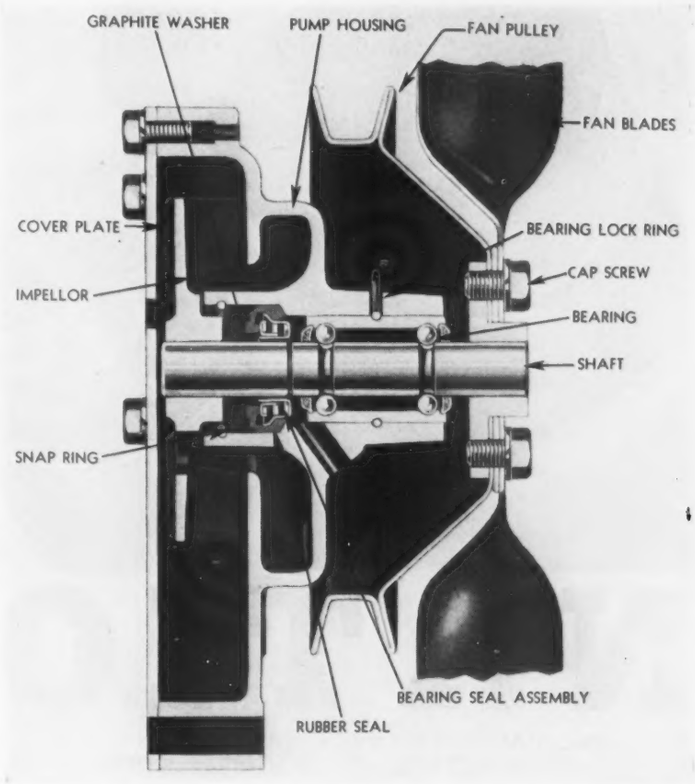
In connection with this business of getting our products into the hands of Johnny Q. Public, there is still another definite trend in the distribution end of the business—that toward complete service outlets in the hands of automobile dealers.

Many years ago, practically all automobile manufacturers decided that they should not confuse a dealer by letting him do anything but sell new cars. The sale of gasoline, oil, tires, and even servicing his own automobiles, was regarded as something that simply diverted his attention from his real job of selling more cars.

This policy, in conjunction with the necessity of finding a means for quickly providing convenient outlets for gasoline and oil, contributed materially to the development of the gasoline filling stations by the oil companies. They were set up in relatively inexpensive independent buildings with low overhead, and have subsequently developed into our neighborhood super-service stations.

Today the fallacy of this reasoning is altogether too apparent to the automobile industry. Gasoline and service business brings contacts that sell cars, and in some cases where used car losses are high, the profit from the parts and service departments represents almost the entire net profit in the business.

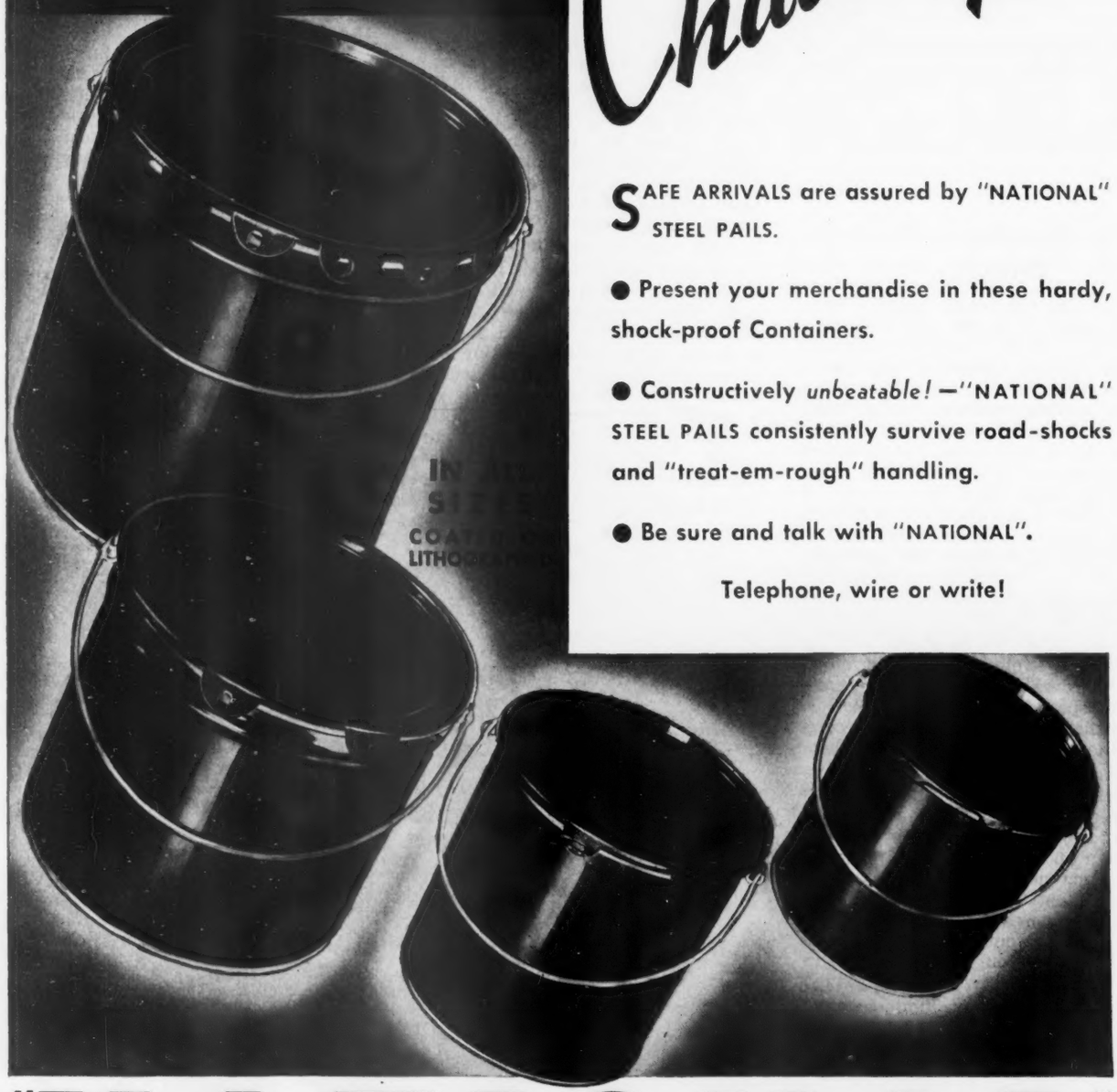
By the same token, it is well known that filling stations selling gasoline and oil only, seldom make a profit—especial-



Water pump used on 1937 Pontiac and Oldsmobile cars. The bearings are packed at the factory, completely sealed, and no lubrication is required

TRANSPORT SHOCKS .....

Challenged



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ly where they pump less than 10,000 gallons a month. Today, even the well run company-owned stations can show a profit only by expanding and selling other services, such as lubrication, tires, washing, batteries, etc., which logically should be sold by a car dealer. And when such filling stations are operated independently as a local man's personal business, the percentage of real profit makers is disappointingly low.

Now we have legislation and other economic influences which make it necessary to remove the rigid company control from many such outlets and appoint them as independent dealers. As already mentioned, in the long run many such dealers are under capitalized, won't do the simple things that we know must be done, and in the end will fail.

CAR dealers, on the other hand, are generally more substantial. They are better capitalized, and today progressive ones are going after lubrication and complete service business; so that as a result, there is a definite trend back to the car dealer as the logical outlet for all of those things connected with the automobile: new cars, used cars, gasoline, oil, and complete service.

This kind of a set-up works, too, as is being proved in thousands of successful dealerships today—in spite of the fact that some oil executives claim the automobile dealer is not interested in oil and gasoline and cannot manage a filling station. He can, and will, if you will only give him the right point of view and will show him that he can.

This does not mean that a car dealer should have a whole string of neighborhood service stations in addition to the one in connection with his main store. Car dealers' neighborhood service stations are a separate subject, far too long for discussion here. Also, it does not mean that car factories intend to get into the gasoline and oil business. Such service stations must be set up under an oil company, on the same basis as any other privately owned service station. Which oil company should do this would depend entirely on local conditions. The car factories are interested only to the extent of making sure that the dealer ties up with a reliable source for his gasoline and lubricants.

Here's where your money goes. Slides taken from a service slide film illustrating losses that occur when dealers neglect super service business. Courtesy of Chevrolet Service Department

The handwriting is on the wall; car dealers with complete one-stop service stations will sell a constantly growing proportion of the gasoline and oil as time goes on, and the oil companies who recognize this and co-operate with car manufacturers in developing these outlets will benefit from the business.

Increasing the Sale of Engine Oil

Policies and procedures for merchandising automobile fuels and lubricants—especially those for increasing the sale of engine oil — should also be in line with current trends in the automobile business and should be based on sound economic principles.

At the present time a committee of representative oil executives is working on a set of rules covering when to change oil in automobile engines, for the dual purpose of insuring longer engine life through better lubrication and of increasing oil sales. While these recommendations are not yet available for general discussion, from what we can learn they are based on the premise of increasing oil sales by getting owners of cars now in use to change oil more frequently, especially during cold weather. Such recommendations would appear to be based on the assumption that there are only a certain number of car miles possible, and therefore the only way to increase sales is to sell more oil per mile.

It seems to us that this is fundamentally the same old theory of scarcity reasoning which has been raised so many times in the past in the better known form of making more jobs by "spreading the work". Also, these recommendations seem to carry an implication of fear and might actually decrease oil sales as a result of making owners afraid to drive their cars.

We would suggest that a more sound approach to the problem would be secured through the following:

1. Get more automobiles in operation. As a matter of fact, the present trend of registrations shows that this is in process, and if actively promoted by everyone concerned with the business, total registrations can be materially increased during the coming year.

2. Get people to drive their cars more by giving them confidence in their automobiles—convincing them that it is a

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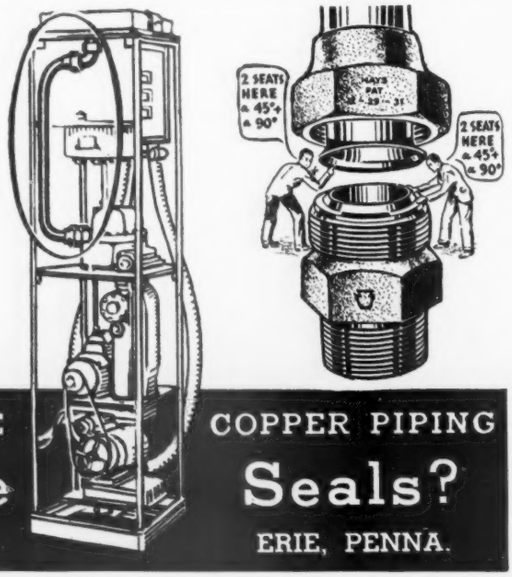

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year-round means of transportation and not scaring them into putting their cars into the garage in winter by telling them it will be necessary to change oil at very frequent intervals in cold weather. Sell them light oil.

3. Take the "junkers" off our highways. Get rid of the cars which cannot be used with comfort and confidence, and through elimination of these vehicles, increase the confidence of the owners, the mileage they will drive throughout the year, and hence sales of gasoline and oil necessary to keep them going.

Conclusions

We have tried to show some definite trends in the business. We have said nothing new and nothing that is not already known to most engineers and sales departments in both industries. Both the automobile business and the oil business are highly competitive today, but our problems are mutual and an exchange of information on the subjects common to both is necessary to our continued successful existence.

No one company alone can afford, nor will any one company alone give out even in a confidential way, detailed information on future designs; but there is no large company in the automobile or the petroleum industry without a research staff who can point the way toward future trends.

Why should we not provide for an exchange of this information? We recognize that this problem cannot be solved by forming another official research or steering committee; but a few oil companies and at least one lubrication information service already have representatives in Detroit who know the engineers and research men, have gained the confidence of the car manufacturers, and who are now on the ground to form the nucleus for a source of such information.

There is no reason why something cannot be done, if we can only get the problems fully recognized in their true light—not only by the engineering and research staffs but also by the management of both industries.

To Distribute in Tulsa

TULSA, Jan. 11.—Bethlehem Steel Corp. will, like several other large steel companies, become a direct distributor of equipment in the oil producing country if negotiations now reported under way are completed. The company is on the point of acquiring control of Taubman Supply Corp. of Tulsa, one of the rapidly growing organizations operating in the Mid-Continent and southwest.

Herman P. Taubman, founder and president of the company, has been in the east conferring with the Bethlehem officials. It is understood that if the deal is completed, Mr. Taubman will continue in active charge. The company recently opened a large warehouse in Houston.

50,000 Lifts in Use

From a start in 1927, when 1500 lifts were purchased, the oil industry now has 50,000 lift or hoist installations in operation at re-sale gasoline stations catering to the needs of motorists, according to the American Petroleum Institute.

Roads Cost U. S. $20,000,000

WASHINGTON, Jan. 11.—Uncle Sam's policy of opening up scenically and historically interesting places and localities to automobile travel has cost him over $20,000,000 for roads and trails in the national parks and national forests alone during the past year, according to annual reports to the President.

F. A. Silcox, chief of the Forest Service, reported that the Bureau of Public Roads had spent $9,391,047 for roads and trails in the forests during the year. This does not include the roads constructed by CCC workers.

In addition, the Park Service, through Director Arno B. Cammerer, reported that it had spent $3,540,720 of the $7,500,000 appropriated for park roads during the past fiscal year, and was carrying over the remainder, along with an appropriation of $6,500,000 for the current fiscal year.

These figures, too, are in addition to construction and repair work on roads done through use of emergency public works funds. While no annual figures are available, Cammerer reported that by the end of the current fiscal year on June 30, $23,026,437 would have been expended for roads and trails from these funds since 1933.

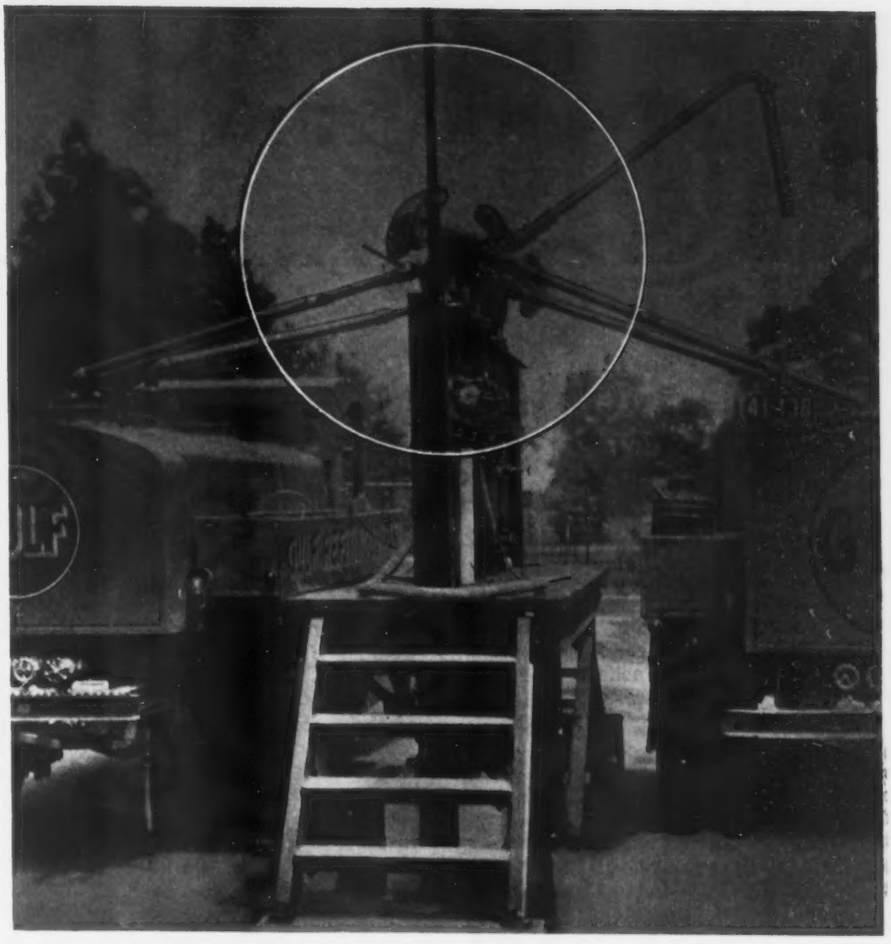
Besides this, the Park Service has let contracts for construction on its two large parkways—Blue Ridge and Natchez Trace—totaling $4,500,000 and $1,500,000, respectively, and much of the work actually is under way.

A tabulation of these figures—$9,000,000 for forest roads, $3,500,000 already expended for park roads and trails under regular appropriations, and $6,000,000 on parkways—shows that less than a $1,500,000 expenditure in the past year of the five-year public-works expenditures for national park roads, listed above as $23,026,437, would put the total in 1936 for park and forest roads above the $20,000,000 mark. It is certain that a great deal more than this comparatively small sum has been spent during the past year.

Not content with upkeep of existing parks and forests, both reports list proposed new recreation and travel spots which may be opened up, and which will necessitate more roads.

In discussing new parkways—scenic drives connecting park areas widely separated—Cammerer said in his report that field reconnaisance and studies were made during the past year of a parkway to connect the Shenandoah National Park, in Virginia, with parks in the New England mountains. Such a parkway would link up with the Blue Ridge Parkway, now being constructed to connect Shenandoah with Great Smokies Park in North Carolina and Tennessee.

Another proposed parkway would connect the Mount Vernon boulevard now running between Washington, D. C., and the plantation of George Washington, with Wakefield, Va., a hundred miles south; a third would link Washington with the historic battlefield at Gettysburg, Pa., a hundred miles north, and still another would connect historic Great Falls, on the Potomac above Washington, with Harper's Ferry, W. Va., another history-breathing and at the same time scenically breath-taking spot.



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Either Side

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"USE HYPOID LUBES FOR HYPOID AXLES" . . .

By JOHN W. THOMPSON
N. P. N. Staff Writer

Is Simplest and Best Servicing Rule

THE hypoid rear axle is not a new development. It made its first appearance in 1926 on the Packard cars, and has been used continuously by Packard since that time.

However, not until this year, when over half of the new cars will be equipped with hypoids, did this type of axle present a critical servicing problem. Heretofore, the cars with hypoid axles were in the higher priced class, with the lubricating job going in the majority of cases to the car dealer. Packard, for example, always specified the rear axle should be serviced by the car dealer. Thus the manufacturer was able to control, in most cases, the choice of lubricant for these axles.

Today, however, with the hypoid pushing into the low priced field on such cars as Chevrolet, Plymouth, and Dodge, the job of educating car dealers, service station attendants, and the car owner, becomes an increasingly difficult one. The use of an improper type of lubricant in hypoid rear axles has resulted in bad scoring of the pinion or ring gear teeth in as little as 300 miles of driving of a new car.

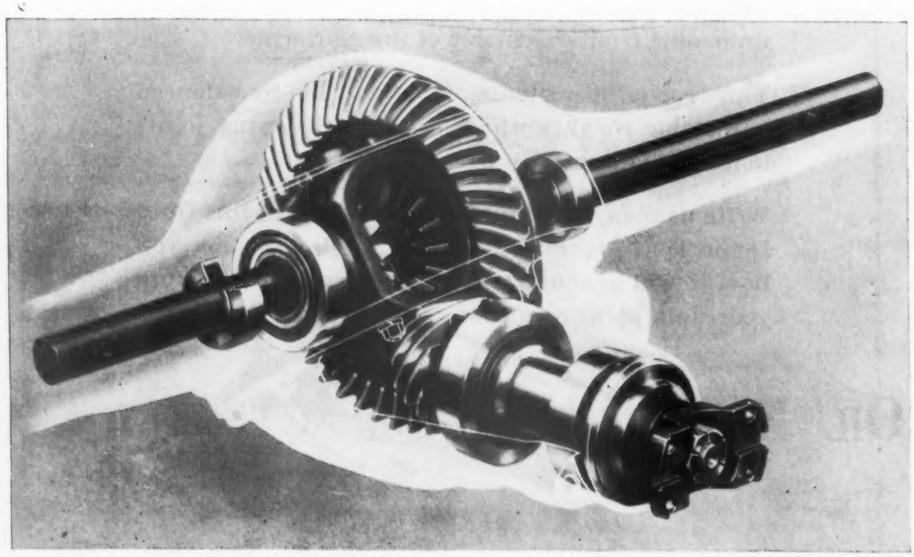
Therefore, it is highly important that hypoid rear axles be serviced in strict accordance with car manufacturers' recommendations so that, in case of axle failure, the customer can have no claim against the oil company or the station attendant. Already there have been cases where a service station operator put a straight mineral gear oil in the hypoid rear axle of a 1937 car, with the result that the oil company was forced to foot the bill for axle replacements on these cars. These few cases should be a lesson to others.

"Use a hypoid lubricant for hypoid axles" is a simple rule to memorize, and it will undoubtedly save the service man much financial embarrassment if rigidly followed.

The "why" of hypoid gears has been told many times. First, the demand for lower and lower bodies made it necessary to lower the propeller shaft, and the hypoid axle, with the shaft center line entering the housing below the center line of the ring gear, made this possible.

Second, the increased strain on rear axle gear teeth, due to the constant increase in horsepower output of the engines, made further development necessary without increasing gear sizes. The tooth design and structure of hypoid gears offers as much as 50 per cent greater tooth strength than spiral bevel gears of the same size.

Third, due to the sliding action of the teeth, hypoids operate much more quietly than has been practicable with spiral bevel gears.



The Packard hypoid rear axle, showing how drive shaft enters housing below center line of axle shaft

Servicing Hypoids

Many oil companies are instructing their dealers not to touch the hypoid axles of the 1937 cars until spring, or until the next seasonal change is due. Car manufacturers are recommending, also, that the factory fill on the hypoids be left untouched during the break-in period of the car.

It is important to follow the simple rule of never adding to the lubricant already in a hypoid axle. Always drain, flush, and refill. The generally recommended mileage interval for draining hypoid lubricants is 5000 miles. Some car manufacturers recommend 6000 miles, and others say drain, flush, and refill every 6000 miles or twice a year, whichever occurs first.

Steam, water, alcohol, gasoline, or kerosine should NEVER be used for flushing hypoid axles. A good grade of flushing oil should be used, and it is important that this oil, as well as all old oil and solid particles, be thoroughly removed before a new lubricant is added.

Practically all of the large oil companies have issued bulletins to their dealers, explaining the hypoid rear axle and stressing the importance of proper servicing. Division field men have been pressed into service to personally carry this service story to the dealers, and one large oil company is making plans to route through its territory a truck equipped with educational material in connection with hypoid servicing. This unit would be used at group dealer meetings and service staff meetings.

The Atlantic Refining Co., Philadelphia, in its hypoid bulletin to dealers, expresses very completely the proper method of servicing hypoids, as follows: "Hypoid gear oils should be changed at least every 5000 miles, or at least twice a year. The correct method installing Atlantic hypoid gear oil is as follows:

"Remove filler and drain plugs from

we can't guarantee to increase your sales 25% . . .

BUT IT CAN BE DONE and is being done with this sure fire money-maker! Furthermore, you'll be tooting your own horn . . . building up your own name and business . . . because you can sell it under your own brand if you prefer.

Canfield's Premium Penn is consistently breaking previous records for gallonage . . . for dollar volume . . . for repeats . . . and for profits.

Motorists are demanding better oils, and here is a top-quality Pennsylvania product that's safe at 5000 RPMs . . . safe way beyond the requirements of the most modern car or airplane!

Every drop of this oil is guaranteed and bonded . . . it gives longer mileage . . . greater protection, and easier starting . . . it wins and holds customers.

Why not toot your own horn in 1937? Marketers everywhere are "going to town" making real profits and progress with Premium Penn.

GET ON THE BAND WAGON for BIGGER SALES and PROFITS in 1937 . . . MAIL THE COUPON

Canfield

* TRIPLE ZONE *

Premium Penn

THE 5000 RPM MOTOR OIL

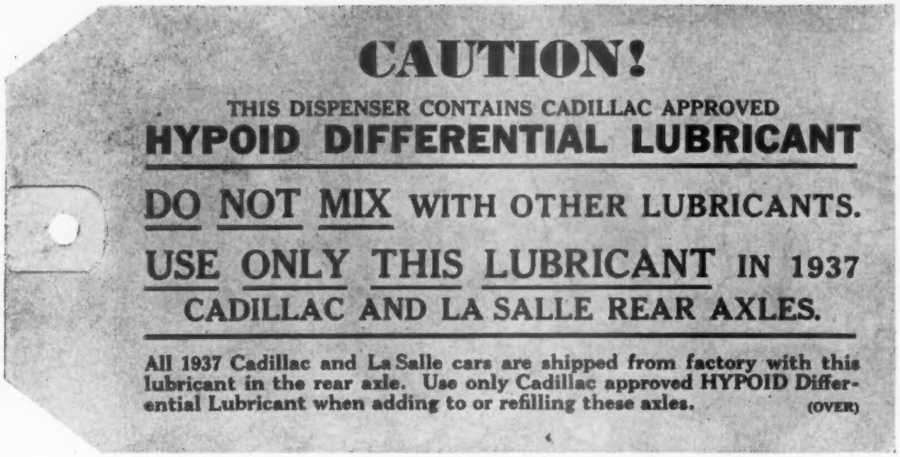
THE CANFIELD OIL CO., CLEVELAND, O.

Refineries, Cleveland, O., Coraopolis, Pa.
Plants, Cleveland, O., Jersey City, N. J.

We want more profits in 1937 . . . Send full particulars on Canfield's Premium Penn Motor Oil. We buy ☐ Sealed Cans ☐ Drums ☐ Tank Cars

Name _____

Address _____


CAUTION!
THIS DISPENSER CONTAINS CADILLAC APPROVED
HYPOID DIFFERENTIAL LUBRICANT
DO NOT MIX WITH OTHER LUBRICANTS.
USE ONLY THIS LUBRICANT IN 1937
CADILLAC AND LA SALLE REAR AXLES.
All 1937 Cadillac and La Salle cars are shipped from factory with this lubricant in the rear axle. Use only Cadillac approved HYPOID Differential Lubricant when adding to or refilling these axles.
(OVER)

Every dispenser and container of Cadillac approved hypoid lubricant is accompanied by one of these warning tags

differential housing. If no drain plug is provided, remove lower cap screws and permit oil to drain out. Since hypoid gear oils are thick, they drain slowly. When drainage has ceased, fill an air-operated spray gun with Atlantic flushing oil, and flush the differential thoroughly by using the gun in the filler hole and—if necessary—in the drain hole. Since hypoid gear oils adhere to the sides of the housing, the spray gun should be turned in all directions to loosen all oil."

"Allow flushing oil to drain out completely. If there is no drain plug in the housing, and the lowest cap screw is not at the extreme bottom, remove all remaining oil with suction gun. Keep the axle level at all times while draining, lest flushing oil or gear oil run into the driveshaft housing."

"When differential housing is completely empty, replace drain plug or cap screws and fill to correct level with Atlantic hypoid gear oil."

Atlantic, in this same bulletin, issues a number of precautions, such as; never drive the car with flushing oil in the differential housing, never add hypoid lubricant to a partially filled housing, and never service hypoid axles which have not been driven for the manufacturer's specified break-in period, or at least 2000 miles.

This bulletin also points out that hypoid lubricants tend to thicken with excessive heat, which may be generated by fast driving, hard pulling through sand, or hauling excessive loads. Seriously thickened gear oil, according to the bulletin, will not flow between the gear teeth, but will channel, with possible serious damage. Frequent examination of the oil is recommended under these driving conditions. Hypoid-equipped cars hauling trailers, for similar reasons, should have the hypoid lubricant examined at short intervals, the bulletin points out.

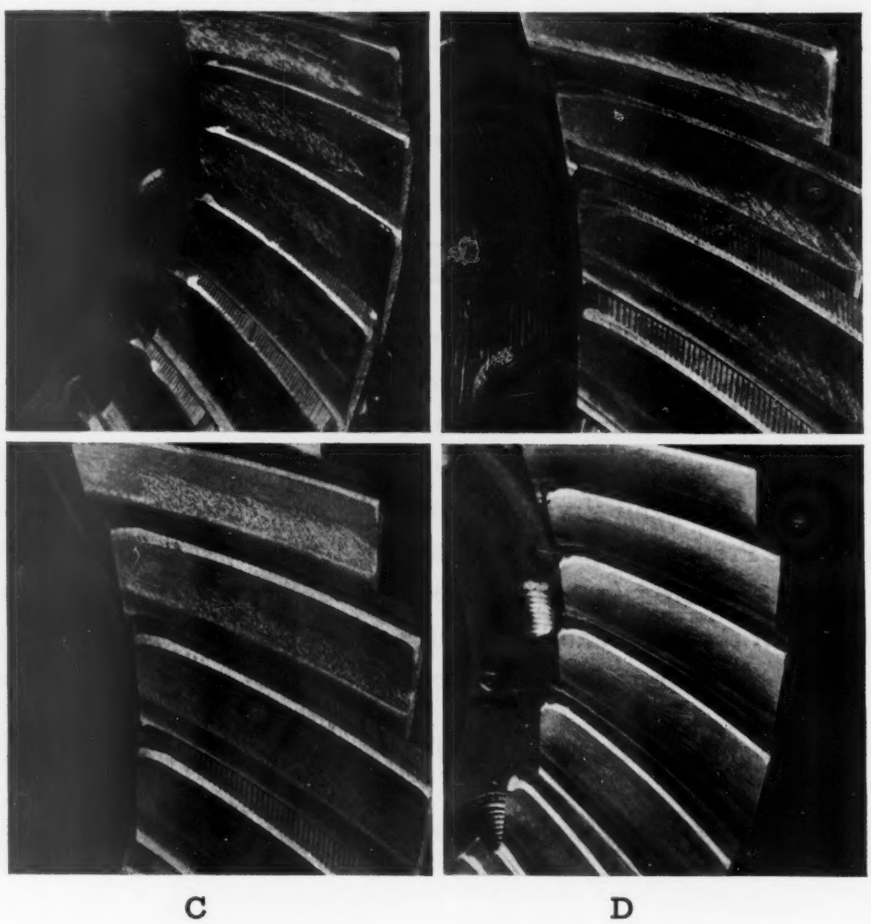
The Standard Oil Co. of New Jersey, through its many company publications reaching dealers, division offices, and field contact men, is doing a thorough educational job on hypoid rear axle servicing. This company points out to its division offices; "It is extremely important that proper instructions be issued to your field organization regarding the lubrication requirements for the new type of axles." A bulletin emphasizes the fact that this company's hypoid lubricant must be used in all hypoid axles, and that "the use of ordinary lubricants will result in severe and rapid damage to the gears.

Socony-Vacuum Oil Co. recently sent bulletins to its dealers urging care in servicing hypoids. This company stresses the importance of complete draining, flushing, and refilling at the customary intervals, with no additions between fills. Socony dealers are also being urged not to service hypoid axles until they have completed their break-in period with the factory lubricant.

While the Pure Oil Co. has developed a hypoid lubricant that meets with the approval of car manufacturers, this company is adopting a policy of caution in urging its dealers to use this lubricant. In the January issue of the Pure Globe, the company's dealer newspaper, it is pointed out that, while this lubricant met the specifications of the car manufacturers, it did not meet the specifications of Pure. The Pure Globe tells dealers that the company cannot ask them to handle a product such as this, that settles out in storage and service, that will etch bearings or wear out tooth surfaces, and that may quickly lose its load carrying ability, when the company already has a product that has been used for four years in hypoid and worm gears and that has been approved by the Gleason Co., the company that manufactures hypoid gear cutting machines.

Pure will continue to recommend its proved extreme pressure lubricant for 1937 cars, regardless of rear axle design, keeping the newly developed hypoid lubricant available for those who insist upon it.

The Texas Co., for the present, is packaging its new hypoid lubricant in 50-pound pails. The company's field force



The Quaker State Oil Refining Corp. uses these photos in one of its bulletins to point out the importance of using hypoid lubricants in hypoid axles. Figure (a) shows the result of a test on a hypoid axle using straight mineral oil as a lubricant. Figures (b) and (c) illustrate what happens when a mild e.p. lubricant is used in a hypoid axle; and figure (d) shows the result of a hypoid axle test using a hypoid lubricant. The (d) test ran 10 times as long as the (a) test

CONTINENTAL CANS *for* HYPOID LUBRICANT

THE use of Hypoid Gears in the 1937 automobiles has brought to manufacturers of gear lubricants a marketing opportunity—and a packaging problem!

And Continental, keeping pace with the industry in which it pioneered the principle of Canned Motor Oil, is first to produce a container especially developed for Hypoid Lubricant and adaptable to high-speed filling and closing.

It is a refinery-sealed can, absolutely impervious to the high penetrative qualities of Hypoid Lubricant, an essential requirement because of the lubricant's tendency to stain cloth or similar materials. Continental cans for Hypoid Lubricant are available in 3 sizes—1-pound, size 3" Dia. x 59/16" Hi. (complete with built-in expulsion disc) 2-pound, size 4¼" Dia. x 59/16" Hi., and 3-pound, size 5⅛" Dia. x 59/16" Hi.

Our representative will be glad to give you full particulars concerning these new containers and furnish samples.

Continental Can Company

New York Boston Baltimore Syracuse Philadelphia Chicago St. Louis Cincinnati Denver Memphis
Wheeling New Orleans Houston Detroit Jacksonville San Francisco Los Angeles Kansas City Omaha

LEAD

FOR E. P.

LUBRICANTS

Say the Experts . . . and that leads to the question of where to get it.

Easily answered. The Metasap Chemical Company for a number of years, has specialized in the manufacture of lead bases which have been tested and approved by a number of well known lubricant manufacturers. Our Metalead 544-A, in particular, is a base that has stood the test of time. It is completely soluble, high in lead content and has a minimum bodying effect on the oil phase. It is an ideal ingredient for E. P. Lubricants.

Why not write today for our latest bulletin on the use of Metalead 544-A in E. P. lubricants. Merely fill in coupon, tear off and mail.

METASAP CHEMICAL COMPANY

Metasap Chemical Co.

HARRISON, N. J.

COUPON

Please send information on Metalead 544-A.

Name .....

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City..... State.....

Hypoid Rear Axle Information

(As Supplied by Car Manufacturers)

Model of Car Using Hypoid	Lub. Spec. Summer	Lube Specs. Winter	When To Change
Buick Models 40 & 60	Hypoid lub. SAE 90	Hypoid lub. SAE 90	Twice a year
Cadillac V-8* Model 60	See dealer	See dealer	6000 miles
Chevrolet*	See dealer	See dealer	Twice a year or 6000 miles
Chrysler All models Except Airflow	Hypoid lub. recommended by refiner	SAE 90 hypoid lub.	6000 miles
DeSoto	Hypoid lub. recommended by refiner	SAE 90 hypoid lub.	6000 miles
Dodge	Hypoid lub. recommended by refiner	SAE 90 hypoid lub.	6000 miles
LaSalle V-8*	See dealer	See dealer	6000 miles
Packard* All models	See dealer	See dealer	10,000 miles
Pierce Arrow All models	Hypoid lub. SAE 90 lead base	Hypoid lub. SAE 90 lead base	10,000 miles
Plymouth	Hypoid lub. recommended by refiner	SAE 90 hypoid lub.	6000 miles
Studebaker All models	See dealer	See dealer	5000 miles

NOTE: Oldsmobile, although equipped with a spiral bevel rear axle, specifies the use of a hypoid lubricant, with changes recommended twice a year or 6000 miles. Hypoid lubricants on the Chevrolet approved list are satisfactory for the Oldsmobile axle.

*Has an approved list of commercially available hypoid lubricants.

and its dealers are being supplied with literature outlining the methods of servicing hypoids, in accordance with car manufacturers' recommendations. In addition, the field men are making personal visits to dealers, impressing them with the importance of proper lubrication of hypoids.

This company's hypoid pail also carries complete instructions and warnings. It is pointed out that the hypoid lubricant is to be used only in hypoid axles, unless otherwise specified by car manufacturers or The Texas Co.

Additional instructions on the pail state that the contents should not be mixed with other lubricants; that the rear axle should always be completely drained and flushed before refilling; and that the lubricant should be used only for the purpose recommended.

Shell plans to market its approved hypoid lubricant in three types of containers—one-gallon cans, 5-gallon pour pails, and 15-gallon drums. The following warning is to be placed on the Shell packages:

"Shell Hypoid Gear Lubricant E. P. complies with all specifications and requirements as outlined by the leading

Servicing Hypoids

In a recent special service bulletin to its dealers, Chevrolet lists the servicing procedure on the hypoid rear axles of its 1937 cars, as follows:

"In general, Hypoid Lubricants of different brands should not be mixed, as chemical reactions may take place which would render the extreme pressure (E.P.) qualities ineffective.

"When checking the level of the lubricant in the Rear Axle, and it is found to be low, the Dealer, if he knows the brand of lubricant in the Housing, may add a sufficient quantity of the same brand to bring it up to the proper level.

"Should the brand of lubricant in the Housing not be known, or if there is any question about it, it should be drained and the Inspection Cover removed. In such cases any sludge or solid matter should be entirely removed with a light flushing oil. Wipe out bottom of the Housing with a rag, replace Inspection Cover, using new Cork Gasket, then refill with fresh Hypoid Lubricant. (UNDER NO CIRCUMSTANCES USE WATER, STEAM, KEROSINE, GASOLINE, ALCOHOL, ETC., to flush out the Housing, as such materials may cause chemical reactions to take place.)

"Seasonal changes of the Hypoid Lubricant are not necessary, as it is an SAE No. 90 grade which flows and lubricates at low temperatures as well as at high temperatures. The viscosity of the lubricant has no bearing upon its extreme pressure (E.P.) properties.

"For those sections where temperatures drop lower than 10°F. below zero for protracted periods, it may be desirable to dilute the SAE No. 90 Hypoid Lubricant with one part of SAE No. 10 Engine Oil and two parts of SAE No. 90 Hypoid Lubricant, unless a lighter approved grade of Hypoid Lubricant is available.

"IMPORTANT: If Hypoid Lubricant SAE No. 90 is diluted with SAE No. 10 Engine Oil, the two should be thoroughly mixed outside the Axle Housing just prior to putting into the Housing.

"CAUTION: Under no circumstances use kerosine, gasoline, etc. to dilute the Hypoid Lubricant.

"The good qualities and effectiveness of Hypoid Lubricants are preserved by the continual 'stirring-up' which they receive when in use in the Rear Axles of the car. An initial 'stirring-up' is provided by servicing Axles with Hypoid Lubricants from SMALL CONTAINERS as the entire contents of the containers are forced into the Housing under pressure.

"It is advisable that the Housing be drained and refilled with new Hypoid Lubricant every *6000 MILES* or twice a year.

"The Hypoid Axle requires three (3) pints, or three (3) pounds, of lubricant."

car manufacturers using hypoid gears.

"Shell Hypoid Gear Lubricant E. P. is for use in hypoid gears only.

"Shell Hypoid Gear Lubricant E. P. must not be used in any transmissions, steering gears or worm drive axles.

"To assure adequate protection to hypoid gears, the lubricant should be completely drained and the gear case flushed and refilled at periods of operation not exceeding 5000 miles.

"Shell Hypoid **Gear Lubricant E. P.** must not be mixed with other makes of hypoid lubricant. Therefore, to guard against possible error, servicing will be done only on the basis of complete drain and refilling of the gear housing. No servicing of hypoid gear lubricant into the customers' cars will, therefore, be done on the basis of mere addition or make-up. Should any car owner insist that Shell Hypoid Gear Lubricant be serviced on the basis of make-up, it is to be distinctly understood that he does so entirely at his own risk."

Cadillac and LaSalle, for the present recommending the use of only Cadillac Hypoid Differential Lubricant in their rear axles, are instructing their dealers that they will approve other lubricants "when independent **sources can develop and submit samples to meet our specifi**cations."

This company is making every effort to make certain that the proper lubricant is used for their rear axles. Hypoid lubricant warning signs have been developed for service station use. These signs emphasize to the car dealer's service men the importance of correct rear axle lubrication, and serve as constant reminders.

Warning tags have also been prepared, for fastening to all equipment and dispensers containing hypoid lubricant, where they will serve as a warning to service men.

The rear axle filler plugs on the 1937 Cadillac and LaSalle models are now furnished with brass discs, on which is the warning to "use only Cadillac approved hypoid lubricant."

Other hypoid warnings are on windshield stickers for new cars, car owner identification cards, and through the new car salesmen. Every time a new Cadillac or LaSalle is sold, the salesman personally explains to the customer the importance of proper rear axle lubrication on his new car.

Some automotive engineers are of the opinion that the hypoid gear is here to stay. W. R. Griswold, of the Packard Motor Co., last summer predicted that all cars and trucks will be using hypoids as soon as machines for cutting the gears can be made in sufficient numbers.

H. R. Wolf, of the General Motors Research Laboratories, pointed out at the API meeting in Chicago last November, that future gear designs may require lubricants of higher load-carryability than the most powerful commercial extreme pressure lubricant available at the present time.

What the future may hold for the hypoid rear axle, the fact remains that they are here today and must be properly serviced. As in the past, the burden of that service will rest on the shoulders of the oil company service station. The immediate problem is one of education, of both the car owner and the service station attendant.

THE OIL INDUSTRY'S LATEST PROBLEM—

SERVICING HYPOID GEARS

THE ANSWER—STANDIX LUBE DISPENSER

Here is a new system for handling and servicing gear oils—a system that the oil industry has been looking for.

● The STANDIX LUBE DISPENSER is easy to load and safe to operate—knife pierces can without danger of cutting operator's hands.—Controlled air pressure does the work—a press of the trigger dispenses the lubricant in a few seconds.

● It empties the can completely, even if badly dented. Servicing differentials, transmissions, and overdrives is no longer a messy operation—STANDIX LUBE DISPENSER does the job in a clean, fast, efficient manner.

● One dispenser handles a variety of lubricants—from heavy gear oil to light motor oil or flushing oil—equipment investment kept to a minimum.

● Lubricants filled in refinery sealed 1, 2, or 3-pound cans—low in cost. (Cost of 3-pound cans not appreciably higher than 100-pound drums.) Prevents substitution and contamination—insures correct lubricant will be used.

● STANDIX LUBE DISPENSER is low in price, attractive in appearance and built to give years of trouble-free service.

Let us tell you the complete story.

THE LUBRICATION CORPORATION

910 South Michigan Avenue Chicago, Illinois

Loading 1, 2, or 3-pound sealed can into dispenser is a fast, simple operation.

Slight pressure on arm causes knife to pierce can—no danger of cutting operator's hands.

Illustrating the speed and volume and cleanliness of delivery.

Modernization and showmanship have entered the display of lubrication equipment. Today the station can add attractiveness and eye-appeal by giving a prominent spot to its equipment

Making The Dealer "LUBRICATION-CONSCIOUS"

SINCE the policy of leasing stations to individual operators has become so widespread, there have been born many programs designed to educate the dealers in the profit possibilities in lubrication service. Oil companies are going to great lengths to interest dealers in going out after this business, instructing them not only in what to do but how to do it.

Hand in hand with this increased interest in lubrication business, and in a measure responsible for its growing importance as a profit item, are the manufacturers of lubrication equipment. Today equipment is available to dealers that will turn out lubrication jobs in half the time that it took a few years ago.

Lifts, grease guns, lubricant dispensers, flexible nozzle couplings, all these have been modernized with the thought in mind of turning out a thoroughly reliable lubrication job in the shortest possible time. Recent lubrication equipment designs show a flare for showmanship which has made possible the attractive display of the equipment in the station as a means of attracting business.

The 1936 campaign put on by the Standard Oil Co. of Ohio to sell lubrication service is a good example of the importance of modern equipment. The entire Standard lubrication campaign was built around Floating Body Lubrication, which centered around an auxiliary lift which raises the weight of the body and engine off the chassis to relieve weight-burdened chassis points. Point-of-sale promotion material was used almost exclusively, including folders, steering wheel cards, A-board signs, and station wall signs.

More than one oil company now has in its mind a 1937 lubrication service sales plan built around the hypoid situation. Hypoids, with their strict servicing requirements, are expected to be instrumental in getting many cars on the lifts. From this point on, complete lubrication service is simply a matter of salesmanship.

A number of companies, including Shell, Standard Oil Co. of N. J., and The Texas Co., have a dealer plan designed to encourage the development of lubrication business. This is in the form of advertising, merchandising, and selling assistance to those dealers whose stations and lubrication equipment measures up to the standard set by the supplying company.

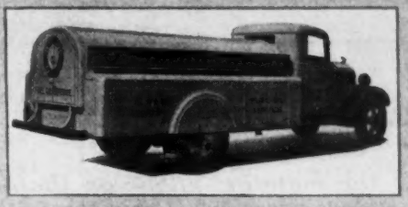
The program of the Shell Union Oil Corp., New York City, is typical of such a plan. To dealers who can qualify, Shell offers "Shellubrication—The Modern Upkeep Service," a comprehensive and thorough system of automotive lubrication, and assistance through merchandising and point of sale aids, as well as personal help from field men.

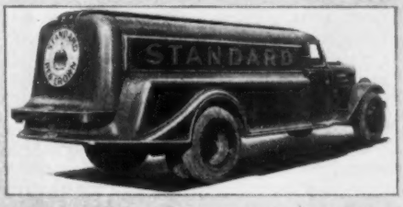
THE plan is aimed at—(1) assuring the repeat business of better satisfied customers; (2) development of new business secured from patrons who have been influenced to try the service through the recommendation of well-satisfied customers; and (3), by the increased gasoline gallonage, motor oil, tire and accessory sales, as a result of a greater number of satisfied customers.

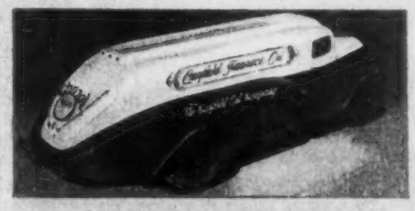
In order to qualify for this service, the dealer must have a station location which has a potential for lubrication business. He must have, or must obtain, equipment required by the Shell plan. The equipment

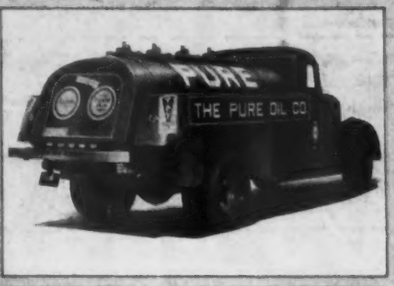
FARRELL TRUCK and TRAILER TANKS

for CITY • • for COUNTRY • • for BULK HAUL









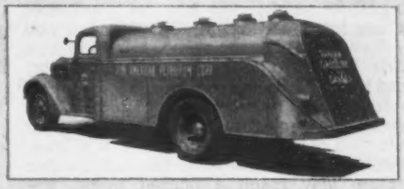
Semi-Streamlined appearance added to standard design with Farrell Beaver Tail and rounded ends of can racks.

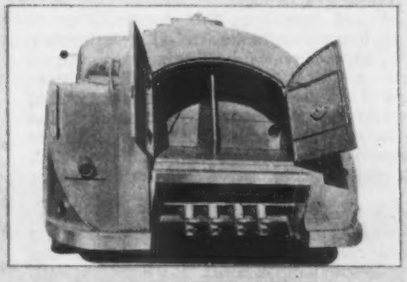
Full skirting, side cabinets, rolled fenders—a practical design for utility and appearance without streamlining.

Semi-Trailer tank, rear head sloped, no bucket box, used for city delivery. One of many Farrell trailer designs.

Farrell Bulk Haul Units are built to stay on the job day and night. Engineered for—1st, Safety—2nd, Durability—3rd, Low per Gallon Mile Cost.

THERE IS A FARRELL FOR EVERY NEED





FARRELL • Lower Per Gallon Mile Cost!

FARRELL MANUFACTURING COMPANY

Factory and General Offices: Joliet, Ill.

District Sales Offices: New York—Philadelphia—Cleveland—Detroit—Chicago

list is lengthy and detailed, including such items as a pit, or lift, or rack, an air compressor, a variety of grease guns, and many other items, down to a long handled wire brush for cleaning springs, and a set of covers for seats, fenders, steering wheels and levers.

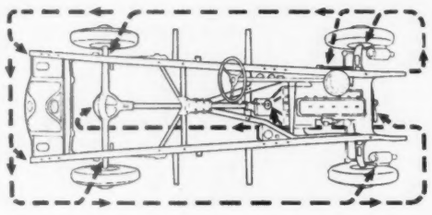
Another Shell requirement which the dealer must meet in order to obtain a Shellubrication license pertains to personnel. The dealer must have well trained lubrication men, or must arrange to train them properly. The company offers assistance in this work.

The dealer must carry a complete line of Shell automotive lubricants, and must agree to exhibit and use only the company's lubricants in or adjacent to the lubritorium and in connection with the lubrication service. The dealer must also agree to conform to Shell's marketing policy, with respect to service charges and general requirements.

The Standard Oil Co. of N. J. is following a similar plan, known as the Verified Esso Lubrication plan. Eligible dealers to purchase this V. E. L. plan must have a device permitting him free access to the under part of the car, and must have guns to handle each of the oil or grease specified on the company's charts. The dealer must also sell Standard fuels and lubricants.

The approved Esso dealer, like the Shell dealer, is supplied with a complete installation of selling, advertising, and promotional material, including an enameled identification sign, lubrication manual and stand, a three-piece direct mail campaign on V. E. L. to 100 selected prospects, 200 reminder postcards, covers to protect the car parts while lubricating, 100 under-the-hood record cards and envelopes, 100 station service record cards, and an indexed station file for service records.

Since this plan was established, Standard has installed it for more than 3000 dealers. The dealer is offered two methods of purchasing the plan. He may buy it outright, or he may purchase it in combination with an aggregate order of grease and gear oil. In the latter case the plan is cheaper.



Sinclair recommends that its dealers follow this plan of lubricating cars. Starting at the left front shackle, work around the outside of the car to the right front, and then down the middle. "Explain to the customer what you are doing, why, and how," is Sinclair's advice, "but make it interesting. Don't bore him with technical words. Your object is to sell him on the superiority of your lubrication service—to gain his confidence."

In 1936 one oil company developed a campaign to point out to dealers that lubrication can be made a profit leader, through expert lubrication service, active solicitation, aggressive follow-up, and assistance from the company field representatives.

In a presentation to dealers, this company used a form sheet on which it was possible for the company salesman to show each dealer the extent of his lubrication potential.

In the case of a new dealer prospect, a fair figure was used to show the profit possibilities in lubrication. It took as an example, a station doing 10,000 gallons per month. Based on an average of 15 miles per gallon, this meant that the station served customers whose average monthly mileage was 150,000 miles. With a chassis lubrication job being specified every 1000 miles, this meant that the lubrication potential was 150 jobs per month.

Likewise, transmission and differential potential was determined by dividing the 150,000 miles by 6000 miles, which gave a

Why Crankcase Oil Should be Changed Regularly

The Committee On Oil Change Practice, now working on a plan to educate the motoring public on the need for regular oil changes, has issued the following reasons why periodic changes are necessary. This committee, composed of representatives of a number of oil companies, hopes to obtain the co-operation of car manufacturers in recommending winter oil changes every 500 miles and summer changes every 1000 miles

1. **Water Contamination**—It is a fact, not commonly known, that over a gallon of water is produced in an engine by the burning of one gallon of gasoline. This water is ordinarily in the form of vapor or steam, but when the jacket water temperatures are low, some of this condenses and frequently gets into the crankcase.

This condition is accentuated by low air temperatures and becomes rapid in sub-zero weather. It is particularly acute when short runs and frequent starts are necessary, as is the case with cars used by physicians, inspectors and salesmen. The same applies to motorists who use their cars only for short distances at a time.

Under these conditions, while the jacket water temperature may reach a normal range, the crankcase remains cold and water in it is not driven off by evaporation.

For Winter operation, this accumulation of water is the major factor in oil deterioration because, almost invariably, it mixes with the oil to form a thick, mayonnaise-like emulsion. Leakage of anti-freeze solution from the cooling system into the engine greatly accentuates the formation of emulsions. These often interfere with normal oil circulation and may, if neglected, lead to ruined bearings, pistons and cylinder walls.

Serious damage may also occur from accumulations of condensed water vapor freezing in crankcases when cars are left standing exposed to low temperatures.

2. **Dilution**—Winter operating conditions also tend to promote dilution of crankcase oil by unvaporized fuel. In intermittent service, automatic chokes may, with cold engines, remain in operation during the entire period of a short run so that rich mixtures are fed to the engine, thereby causing excessive dilution from the heavy ends of unburned fuel.

The efficiency of the electrical system is always lower in cold weather. Battery output is much reduced, resulting in slower cranking. Ignition efficiency may be impaired by decreased battery voltage. Failure of the electrical system to function at high efficiency during extreme cold weather may result in unburned fuel working into the crankcase to cause excessive dilution of the lubricating oil. This condition may be aggravated if spark plugs have become fouled or are improperly adjusted.

3. **Dust**—Dust is always present in the atmosphere. The accumulations of dust on the body of the car and on the oil surfaces of the engine are a rough indication of this. Dust storms, detours, country roads, and road shoulders are all major sources of dust. Even in cities, the dust content of the air is appreciable as Public Health Department records show that a dust fall of from one to four tons per square mile per day is not unusual in American cities.

Ordinarily, from 3 to 27 cubic feet of air per minute is forced through engine crankcases to ventilate them. This is small compared to the amount of air which passes through the carburetor into the cylinders. For the average car under normal driving conditions, this amounts to approximately 100 cubic feet per minute. Since crankcase ventilators do not normally have air cleaning equipment and as most carburetor air cleaners cannot be expected to remove all of the dust, considerable quantities may enter the engine under ordinary operating conditions.

Dust is an abrasive and promotes wear. In extreme cases it has been known to ruin engines completely in less than 1200 miles of operation.

Oil filters can provide only partial protection against wear from dust or other contaminating materials, for only a small proportion of the oil in circulation passes through them. They may become clogged and when neglected may be ineffective over a considerable portion of the period during which they are in service.

4. **Oil Contamination**—Under normal operating conditions, oil undergoes gradual chemical change in contact with air and the metals in the engine. These changes result in the development of chemical compounds which may in time result in damage to bearings, cylinder walls, wrist pins and other delicately finished surfaces in the engine, if such contaminated oil is allowed to remain in the crankcase for too long a period.

Chemical changes leading to the development of these contaminating substances are accelerated by the presence of the contaminating substances themselves, in the same way that one rotten apple in a barrel soon leads to the destruction of the remaining good fruit. Accumulation of these contaminants either in the oil itself or as deposits in crankcases or oil filters seriously endangers the stability of the lubricant.

Protracted use of lubricating oil too frequently entails the development of non-lubricating substances which increase engine drag, promote excessive carbon formation, and may result in stuck rings, clogged oil screens and ultimately in failure of the lubricating system and damage to the engine.

The amount of these various contaminants in crankcase oil depends upon the distance or time a car is operated and upon operating conditions. As the quantity of these contaminating substances in crankcase oil can only be determined by laboratory analysis, which is not practical for the average car owner, his only safe method of assuring engine protection and efficiency is to drain oil at sufficiently frequent intervals to avoid dangerous contamination.

DETROIT ADVISES . . .

"PENOLA EXPEE COMPOUND FOR HYPOID GEARS!"

Automobile Plants Use 1937's Most Generally Accepted and Most Widely Sold Extreme Pressure Grease As Initial Lubricant in New Cars

FOLLOW DETROIT'S EXAMPLE!

Why do General Motors, Packard and others use Penola Expee Compound for the *first* lubrication of new cars leaving the factory?

Because they know that old-style gear greases can't take the greater pressures and higher speeds of hypoid gears . . . allow scoring, scuffing and breakdowns.

Because they know from three years of practical experience that Penola Expee Compound *will* stand the extreme pressures to which hypoid gears are subjected. And because Penola Expee Compound is made and backed by the world's leading makers of specialized lubricants...acknowledged pioneers in extreme pressure lubrication.

PENOLA GREASES • PENOLA INC. • 30 ROCKEFELLER PLAZA, NEW YORK, N.Y.
(Formerly Pennsylvania Lubricating Co.)
Grease Works Operated at Baton Rouge, La. Eldorado, Kans. Baltimore, Md. Pittsburgh, Pa.

Send for this free file booklet — "1937 Cars Demand Extreme Pressure Lubricants." It will help you to hold your E. P. lubricant customers and win even greater volume and profits in this big new market!

A portable gun rack, wheeled into the lubritorium entrance, helps to advertise this Shell Union Oil Corp. dealer's lubrication service

total monthly potential for this particular station of 25 transmission and differential changes.

In figuring the income for this example, this company multiplied the number of lubrication jobs by $1, and the number of transmission and differential changes by 6 (which represents the pounds of lubricant used) and then by 30 cents, the amount received per pound. These two services totaled a gross income on lubrication of $195 per month on a 10,000-gallon station.

SIMILARLY, the record form indicates a place for figuring the cost of material in doing these lubrication jobs. In the case of the example, the cost of products to the dealer was $36.37. Thus a profit on this station came to $158.63 per month for lubrication work alone, not including crankcase oil changes.

Some time ago this oil company started a dealer development program on an experimental basis, to help dealers increase their business. With this plan, the first dealer development car was put into operation. The idea expanded rapidly, and today nine such merchandising cars are on the road.

These cars are of the 1½-ton panel type, with interior shelf and bin arrangements especially designed to do the required work, and are fully equipped with tools and merchandising material arranged for quick access.

The cars' function is to co-operate with the dealers in improving the physical appearance of the stations. There are two trained men to a car, and each crew spends about a day with one dealer. The station gets a thorough going over, the crew doing the actual work, with the dealer's help. Advertising material is replaced or re-located, and attractive window or island displays are set up.

The crew then shows the dealer, by demonstration, the proper and most efficient method of platform service and merchandising, showing him how to increase sales by solicitation at the pump. The crew makes an analysis of the dealer's trading area and a neighborhood solicitation campaign is begun. Plans and methods of following up customers and prospects are discussed with the dealer, and he is instructed in the proper use of advertising and point-of-sale merchandising material. The crew also offers suggestions in more efficient methods of lubricating cars, often doing the complete job on a customer's car to bring out their points.

In addition to these 9 dealer development cars, this company has 6 motor test cars on the road for the use of dealers. These cars are fully equipped to check and analyze the efficiency of engines. These cars are made available to dealers upon application. Dealers are informed in advance when they may have the use of the cars, in order that a neighborhood campaign can be prepared to get customers into the stations on those days. The motor test cars are also finding wide use in connection with this company's commercial accounts where large fleets are involved.

A similar plan was developed on the west coast by the Associated Oil Co., to promote the sale of its Ethyl gasoline. This company introduced a portable motor check car, which is the first unit of its kind in that territory.

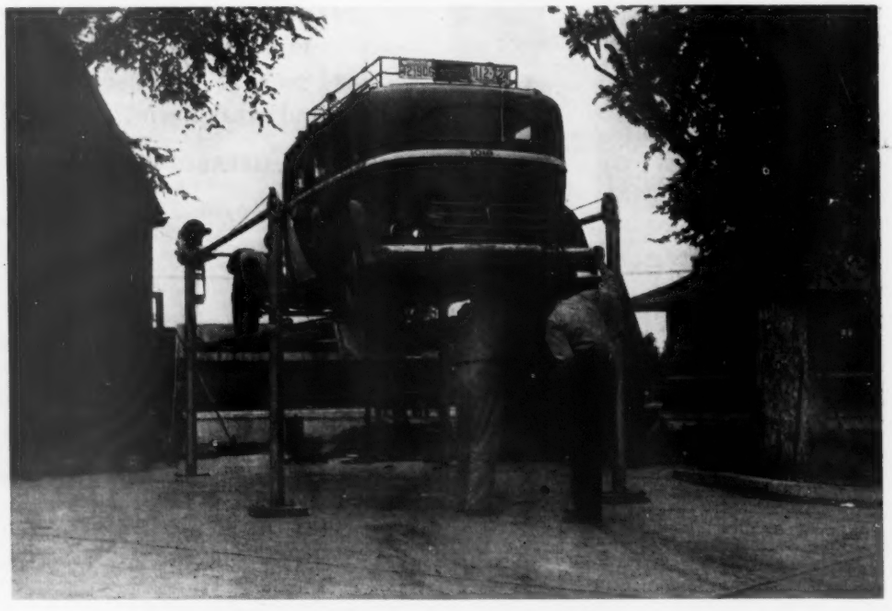
This portable checking station will be operated so as to enable the neighborhood Associated dealer and the dealer in smaller communities to offer his customers the same service in adjusting motors for the use of the company's "Aviation" Ethyl as is now afforded at permanent stations located in the large metropolitan areas.

THE new portable station is complete in every detail, being equipped with the latest scientific precision motor checking instruments, including a synchrograph for synchronizing distributors. The station is contained in a specially designed truck and can be set up right in the service station yard.

Although the tune-up service was designed primarily to promote greater motor efficiency through the use of the company's new Ethyl gasoline, it has developed into more than a mere adjustment. When a customer brings his car in for a checkup, it receives a complete tune-up and its deficiencies, if any, are pointed out to the car owner. No mechanical changes are made other than those usually considered and provided for by the car manufacturers as adjustments.

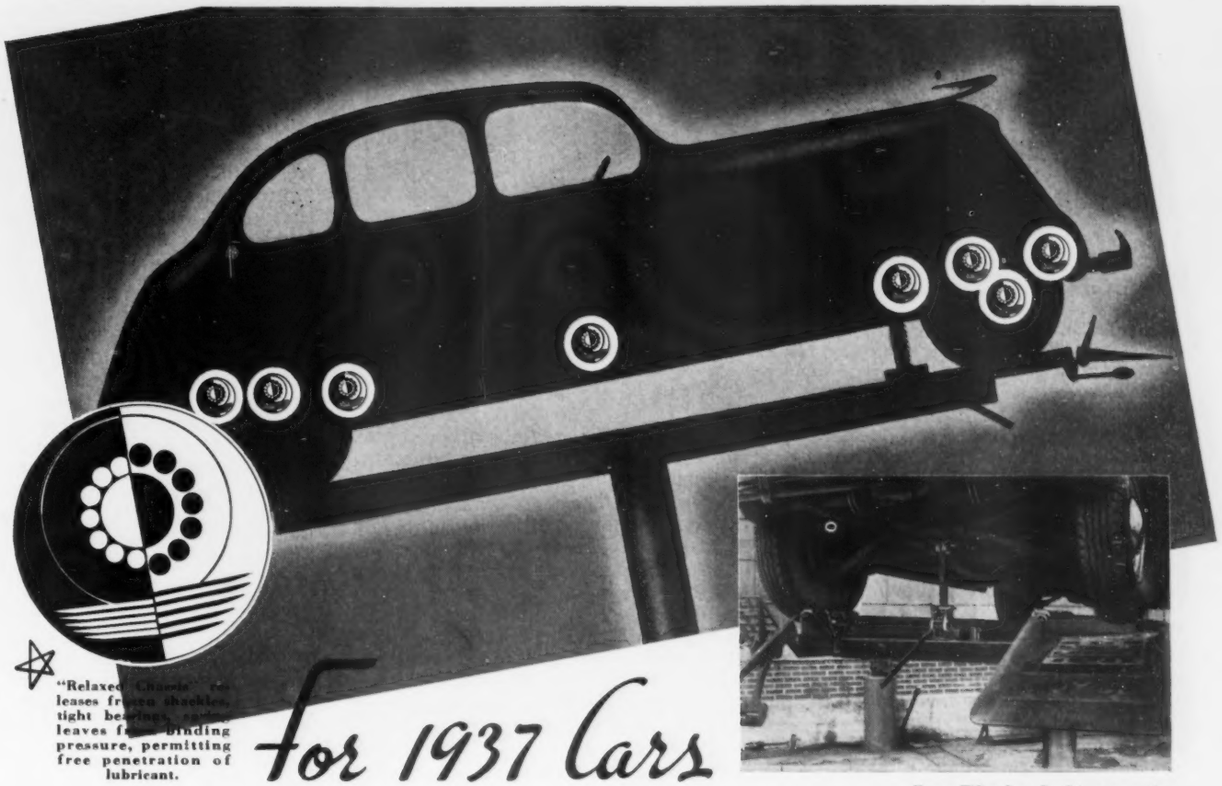
The Sinclair Refining Co. produced a series of sound slide films to show to dealers, covering a multitude of subjects pertaining to selling, servicing, and business development. One of these films, entitled "Building Better Business," points out the aids to better business and shows how to take advantage of them. The aids are: personal calls, letters and postcards, telephone calls, Sinclair dealer newspaper, follow-up cards, special or seasonal invitations, and credit cards. This film ends with the message—"Business Goes Where It Is Invited And Stays Where It Is Well Treated."

In another film—"Selling Complete Lubrication"—Sinclair points out that if the dealer wants to make his lubrication business profitable he must first equip the



Many station operators prefer an outside lift, where climatic conditions are favorable. The lift, in plain view of passing motorists, serves as a constant reminder that this station offers lubrication service. This is a Phillips Petroleum Co. station, at Bartlesville, Okla.

RELAXED CHASSIS LUBRICATION...



"Relaxed Chassis" releases frozen shackles, tight bearings, resting leaves from binding pressure, permitting free penetration of lubricant.

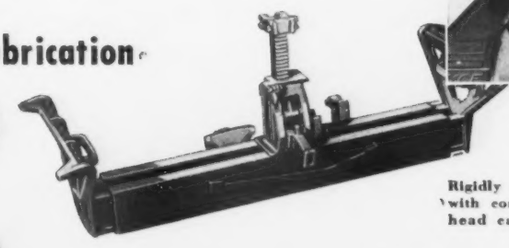
For 1937 Cars

Free Wheeler Jacking on the front end for better lubricating.

- To lubricate modern cars better, easier, faster . . . to get more grease jobs . . . to have your trade boast that your "Chassis-lubes" last longer—use RELAXED CHASSIS Lubrication with JOYCE Free Wheeler Jacks.
- These powerful, portable, quick-lifting units fit any lift, or pit, and quickly, safely hoist the car body weight off the chassis. More headroom to work, all fittings accessible, you lubricate in half the time with less pressure and better penetration. JOYCE Free Wheeler Jacks slide into any position for lubricating, tire service or brake adjustments.
- Car owners turn to modern equipped service for best results. Provide it with JOYCE Free Wheeler Jacks.

Removing body weight spreads spring leaves and releases shackles.

Jack folds out of the way for driving over.



Rigidly built, adjustable width, with complete set of detachable head caps for every purpose.

JOYCE Twins of Lubrication

Offer the only equipment combination for complete lubrication of modern cars. See your dealer or mail coupon.

JOYCE FREE WHEELER JACKS

JOYCE LIFTS

THE JOYCE-CRIDLAND CO. • DAYTON, OHIO

Manufacturers of Hydraulic Lifting Devices since 1873

JOYCE FREE WHEELER JACKS

The Joyce-Cridland Co., Dayton, Ohio.

Please send information on JOYCE products checked below:

☐ JOYCE Free Wheeler Jacks
☐ JOYCE Hydraulic Lifts.

Name_____

Address_____

This new Richfield station in Hollywood, Cal., turned out 250 lubrication jobs in one month recently. When the old station stood on this site, lubrication jobs averaged less than 100 a month. Modernization pays dividends

station with the needed guns and tools, and must carry the necessary stocks of merchandise. He must display them well. Facilities must be provided for the customer's comfort while he is waiting for the job, and he should be encouraged to watch the dealer do the lubrication work, at least once. Other requirements for making lubrication profitable, as brought out in the Sinclair film, are that the job should be done right, that the dealer should explain and demonstrate as he goes, selling the customer on everything he does, and that he should build customer confidence.

Each of the films in the Sinclair series was made into booklet form, and these booklets were distributed to dealers after they had seen the films. Merchandising field men in each division of the Sinclair organization are equipped with films and projecting machines. Each division field man is responsible for 35 or 40 stations where he works with the dealers on such phases of operation as cleaning up the station, arranging displays, outlining the profit possibilities in lubrication and other station services. The merchandising man also assists the dealer in setting up a job ticket system, and makes personal calls with the dealer to familiarize him with the technique of going after business.

The Sinclair policy states that dealers pay for part of the merchandising and advertising promotional material individualized to be of direct service to the dealer. It is felt that this policy helps to increase the importance and value of the material in the minds of dealers.

Modernization of service station facilities and equipment when carried out in an intelligent manner so as to provide faster and more efficient service can be made to pay big dividends in the form of additional profits from service and accessory sales. This was clearly demonstrated on a location controlled by Richfield Oil Co. in Hollywood, Calif.

Lubrication jobs with old equipment had averaged less than 100 cars per month and when the new equipment was being ordered it was decided to put in only one lift, but provision was made for a second should future business warrant it. The station had been opened only three months when the need for another lift became apparent. This was installed when the station turned out its first 200-job month and within another 30 days the station was doing 250 jobs.

Solicitation at the pump island was instrumental in bringing about most of this increase. The customer could sit in his car within full view of the attractive lubrication department and be informed that the station was equipped for night lubrication and the suggestion made that next time he attended a theater in the neighborhood he should leave his car for servicing.

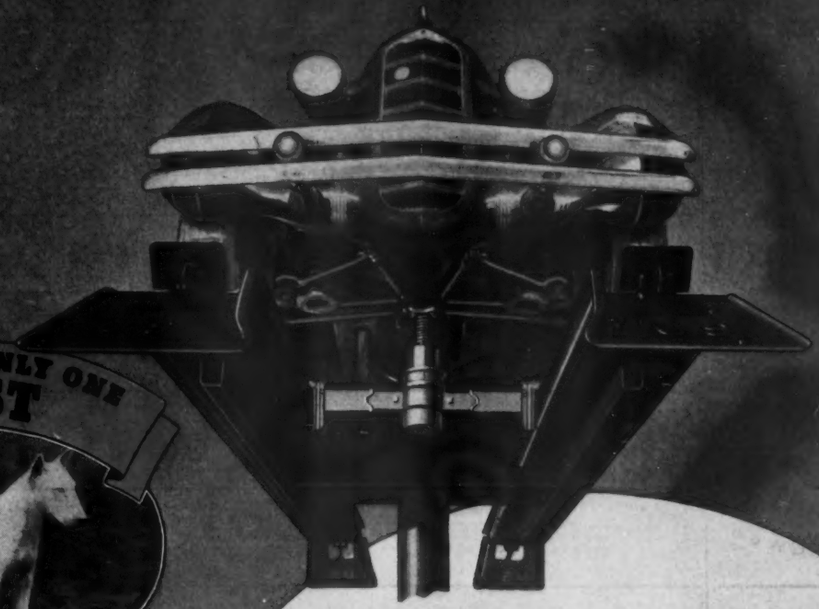
Richfield has been at this same location for four years. In 1934 the station averaged about 94 lubrication jobs a month, now the average is 250 jobs, involving 300 pounds of grease and 500 gallons of motor oil. Emphasis on lubrication work bring increased sale of tires, batteries, and accessories, because the average motorist will listen to a sales talk on these items where he can be shown the need and has time to look.

During the first month the station was equipped with two lifts, the station did 122 wheel packs, sold 168 spark plugs, 35 tires, 15 batteries, and a number of other accessory items, such as light bulbs, windshield wiper blades, oil filters, that had been slow movers when he had to rush a car off the one hoist to make way for another.

One company points out to its dealers that "Business comes to those who look after their business, which means looking after their customers." The dealer is the focal point in oil company educational programs and his lubrication business is fast becoming the center of plans for increasing station profits.

This portable checking station, operated by the Associated Oil Co. on the Pacific coast, enables the company's neighborhood dealers and dealers in smaller communities to offer their customers the same motor adjustment service that is offered in the stations in metropolitan areas

U.S. FLOATING BODY LUBRICATION

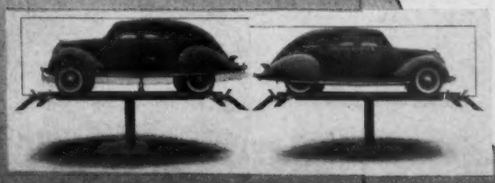


Cha. Pantigon of Enderley
Owner: Mrs. Z. Platt Bennett
Wilkes Barre, Pa.

THE "MIRACLE MAN" *of Lubrication*

U. S. Floating Body Lubrication has been an absolute sensation from coast to coast. Reports keep pouring in from small operators and major oil companies alike claiming increases in business from 25% to 500% showing how quickly *Floating Body Lubrication* pays for itself. It has the greatest merchandising appeal, greatest business building possibilities and the greatest driving thrill for the motorist. It is one of those rare pieces of automotive equipment that really does wonders for the service station and wonders for the car. Motorists will notice immediately the remarkable improvement in the riding, driving and running of their car. Regardless of your location, *U. S. Floating Body Lubrication* will positively increase your business.

Write for the free booklet on Floating Body Lubrication



NEW *Floating Body* METHOD

OLD METHOD

U S AIR COMPRESSOR COMPANY ··· CLEVELAND, OHIO

AIR COMPRESSORS • AIR TOWERS • HYDRAULIC LIFTS
GREASING EQUIPMENT • CAR WASHING SYSTEMS

1937 PASSENGER CAR CAPACITY CHART

With Lubricant Recommendations

MAKE and MODEL	CRANKCASE						TRANSMISSION			DIFFERENTIAL				
			Summer		Winter			Summer	Winter		Summer	Winter		
	Oil Fill Pipe Location	Cap. Qt.	Above 90°	90° to 32°	32° to Zero	Zero to -15°	Cap. Pt. or Lb.	Consistently Above 32°	Consistently Below 32°	Cap. Pt. or Lb.	Consistently Above 32°	Consistently Below 32°	Cooling System Qt.	Gas Tank Gal.
AMERICAN BANTAM														
1937	L	4	30	30	20W	10W	¾	160	90	¾	160	90	6	5
BUICK														
40—1937	R	6	30	20	10W	10W	1¾	160	90	3	HYP	HYP	13¼	18
60—1937	R	8	30	20	10W	10W	2½	160	90	3	HYP	HYP	17	18
80, 90—1937	R	8	30	20	10W	10W	2½	160	90	4	160EP	90EP	17	20
CADILLAC														
V-8 (60)—1937	L	7	30	20W	10W	10W	2½	90EP	90EP	5	HYP	HYP	25	22
V-8 (65, 70, 75)—1937	L	7	30	20W	10W	10W	2½	90EP	90EP	5	90EP	90EP	25	25
V-12 (85)—1937	L	9	30	20W	10W	10W	2½	90EP	90EP	5	90EP	90EP	17	25
V-16 (90)—1937	L	10	30	20W	10W	10W	4½	160EP	90EP	6	90EP	90EP	24	30
CHEVROLET														
Master (GA, GB)—1937	R	5	30	20	10W	10W	1½	160	90	3	HYP	HYP	14	14, 18
CHRYSLER														
Airflow Custom 8 (C13)—1937	L	7	30	20W	10W	10W	4½	160	90	5¼	160	90	17	20½
Imperial 8 (C14)—1937 (Conv.)	L	6	30	20W	10W	10W	2¼	160	90	3¼	HYP	HYP	22	16
Imperial 8 (C14)—1937 (With T.O.)	L	6	30	20W	10W	10W	3¼fw	70	50	3¼	HYP	HYP	22	16
Imp. Cust. 8 (C15)—1937 (T.O. Std.)	L	6	30	20W	10W	10W	6¼fw	70	50	6¼	HYP	HYP	21	20
Royal 6 (C16)—1937 (Conv.)	L	5	30	20W	10W	10W	2¼	160	90	3¼	HYP	HYP	20	16
Royal 6 (C16)—1937 (With T.O.)	L	5	30	20W	10W	10W	3¼fw	70	50	3¼	HYP	HYP	20	16
Airflow 8 (C17)—1937 (T.O. Std.)	L	6	30	20W	10W	10W	6¼fw	70	50	4	160	90	17	21
CORD														
812—1937	C	8	40	30	20W	10W	10	90EP	90EP	Trans. & Diff. Combined			28	21
DE SOTO														
6 (S3)—1937 (Conv.)	L	5	30	20W	10W	10W	2¼	160	90	3¼	HYP	HYP	20	16
6 (S3)—1937 (With T.O.)	L	5	30	20W	10W	10W	3¼fw	70	50	3¼	HYP	HYP	20	16
DODGE														
6 (D5)—1937	L	5	30	20W	10W	10W	2¼	160	90	3¼	HYP	HYP	16	16
FORD														
V-8 (60)—1937	L	4	50	40	20W	10W	1¾	160	90	2½	160EP	90EP	15	14
V-8 (85)—1937	C	5	50	40	20W	10W	2½	160	90	2½	160EP	90EP	22	14
GRAHAM														
Crusader (75, 85)—1937	L	5	40	30	20W	10W	1½	160	90	2	160EP	90EP	12	12
Cavalier (95)—1937 (Conv.)	L	5	40	30	20W	10W	1½	160	90	2½	160EP	90EP	15½	15
Cavalier (95)—1937 (With T.O.)	L	5	40	30	20W	10W	4fw	70	50	2½	160EP	90EP	15½	15
Supercharger (116)—1937 (Conv.)	L	5	40	30	20W	10W	2½	160	90	2½	160EP	90EP	15½	15
Supercharger (116)—1937 (With T.O.)	L	5	40	30	20W	10W	5½fw 4fw	70	50	2½	160EP	90EP	15½	15
Supercharger (120)—1937 (T.O. Std.)	L	5	40	30	20W	10W	5½fw 4fw	70	50	2½	160EP	90EP	15½	15

HUDSON														
6—1937	L	5	30	30	20W	10W	3	90EP	80EP	3	160EP	90EP	13	16½
8—1937	L	7	30	30	20W	10W	3	90EP	80EP	3	160EP	90EP	20	16½
LA SALLE														
50—1937	L	7	30	20W	10W	10W	2½	90EP	90EP	5	HYP	HYP	25	22
LINCOLN														
Zephyr—1937	R	6	50	40	20W	10W	2½	160	90	2½	160EP	90EP	27	19
V-12—1937	L	12	40	40	20W	20W	6	160	90	6	160EP	110EP	32	26
NASH														
La Fayette 400—1937 (Conv.)	L	6	40	30	20W	10W	3½	90EP	90EP	4	90EP	90EP	20	20
La Fayette 400—1937 (With T.O.)	L	6	40	30	20W	10W	6fw	70	50	4	90EP	90EP	20	20
Amb. 6 (3720)—1937 (Conv.)	C	7	40	30	20W	10W	3½	90EP	90EP	4	90EP	90EP	17	20
Amb. 6 (3720)—1937 (With T.O.)	C	7	40	30	20W	10W	6fw	70	50	4	90EP	90EP	17	20
Amb. 8 (3780)—1937 (Conv.)	C	7	40	30	20W	10W	3½	90EP	90EP	6	90EP	90EP	18	20
Amb. 8 (3780)—1937 (With T.O.)	C	7	40	30	20W	10W	6fw	70	50	6	90EP	90EP	18	20
OLDSMOBILE														
6 (F-37)—1937	L	6	30	20	20W	10W	2	160	80	2½	90EP	90EP	16	18
8 (L-37)—1937	L	7	30	20	20W	10W	2	160	80	2½	90EP	90EP	20	18
PACKARD														
6—1937	L	7	40	30	20W	10W	2	160	90	4½	HYP	HYP	17	17
8 (120-C)—1937	L	7	40	30	20W	10W	2	160	90	4½	HYP	HYP	20	20
Super 8—1937	L	8	40	30	20W	10W	4½	160	90	6½	HYP	HYP	24	25
12—1937	L	10	40	30	20W	10W	4½	160	90	6	HYP	HYP	40	30
PIERCE-ARROW														
8 (1701)—1937 (T.O. Std.)	L	9	30	30	20W	10W	7fw	90	80	6	HYP	HYP	25	30
12 (1702, 1703)—1937 (T.O. Std.)	C	11	30	30	20W	10W	7fw	90	80	6	HYP	HYP	38	30
PLYMOUTH														
6 (P3, P4)—1937	L	5	30	20W	10W	10W	2¼	160	90	3¼	HYP	HYP	15	16
PONTIAC														
6—1937	L	6	30	20	10W	10W	1¾	160	90	3	160	90	16	18
8—1937	L	7	30	20	10W	10W	1¾	160	90	3	160	90	19	18
STUDEBAKER														
Dictator 6 (5A, 6A)—1937 (Conv.)	L	5½	40	30	20W	10W	2½	70	50	3	HYP	HYP	13	18
Dictator 6 (5A, 6A)—1937 (With T.O.)	L	5½	40	30	20W	10W	6fw	70	50	3	HYP	HYP	13	18
President 8 (3C)—1937 (Conv.)	L	8	40	30	20W	10W	3	70	50	3½	HYP	HYP	16	18
President 8 (3C)—1937 (With T.O.)	L	8	40	30	20W	10W	4½fw	70	50	3½	HYP	HYP	16	18
TERRAPLANE														
6—1937	L	5	30	30	20W	10W	3	90EP	80EP	3	160EP	90EP	13	16½
WILLYS														
37—1937	R	4	30	30	20W	10W	1¼	160	90	1¼	160	90	11	8

CRANKCASE • TRANSMISSION • DIFFERENTIAL — *Capacities are for Refill*

KEY

10W	— No. 10W Engine Oil	80	— SAE 80 Fluid Gear Lubricant
20W	— No. 20W Engine Oil	90	— SAE 90 Fluid Gear Lubricant
20	— SAE 20 Engine Oil	110	— SAE 110 Fluid Gear Lubricant
30	— SAE 30 Engine Oil	160	— SAE 160 Fluid Gear Lubricant
40	— SAE 40 Engine Oil	80EP	— SAE 80 Extreme Pressure Lubricant
50	— SAE 50 Engine Oil	90EP	— SAE 90 Extreme Pressure Lubricant
60	— SAE 60 Engine Oil	110EP	— SAE 110 Extreme Pressure Lubricant
70	— SAE 70 Engine Oil	160EP	— SAE 160 Extreme Pressure Lubricant

KEY

H Y P—Hypoid gears; special HYPOID lubricant MUST be used.
B — Both sides of hood. F — Front of hood. R — Right side of hood.
C — Center of hood. L — Left side of hood. T.O. — Transmission Overdrive.
fw — Free wheel or overdrive capacity included in transmission capacity given.

WARNING . . . Do Not Mix Hypoid or E. P. Lubricants . . . Always Drain–Flush Out–Refill

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SAFETY PRECAUTIONS

By ARCH L. FOSTER
N. P. N. Staff Writer

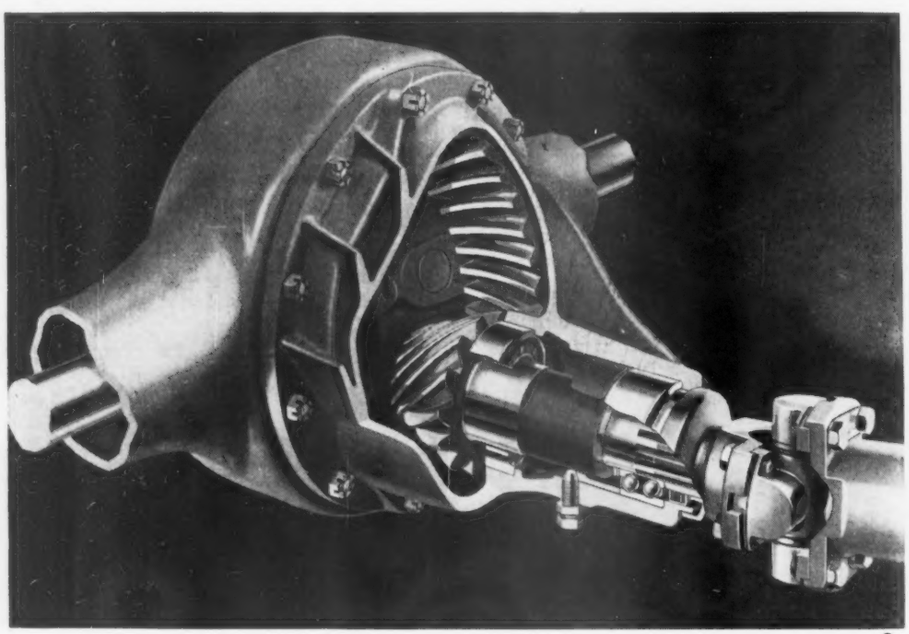
Must Be Observed In Servicing Hypoid Gears

THE development of hypoid and various other types of rear-axle gears during the last few years has complicated seriously the problem of station servicing all these different gears used by different makes and models of cars. The older types of gear really required only mineral oil, so far as lubrication was concerned. Soaps of different types were added to the oil to produce a grease, so-called, the virtue of the soap being chiefly to thicken the oil, increase its adhesiveness so that the oil, the actual lubricant, would be held in contact with the bearing surfaces, the gear teeth, and accomplish its purpose.

Unit bearing pressures, that is, the number of pounds of pressure per square inch of tooth face, were so low that good mineral oil maintained a film between the teeth and transmitted the engine power to the rear wheels without appreciable danger of metal-to-metal contact and resultant seizure and wreckage of the gear. The recent remarkable increases in engine speeds and power, increases in road speeds, in tooth pressures, in gear ratios, made the hypoid and similar types of gears desirable. In these gears, as explained elsewhere in this issue, tooth pressures are increased to an extreme degree, so that mineral oil alone has not proved satisfactory for their lubrication.

The result is that a different type of lubricant must be used for servicing these gears. This insistance of the motor manufacturers, it must be realized, is not a figment of the imagination, not a shouting of "Wolf, Wolf!" when no danger is present, but a most serious and undebatable fact, known to all who are informed on the subject. The service section of the industry must realize, therefore, that this problem is one where individual judgment is of no avail; that failure to properly service the gears of the new cars using hypoids holds the practically absolute certainty of grief for car maker and oil service company as well. It is not a case of "Aw, I've been in this business 25 years, and no car ever needed such a lubricant—therefore they don't need it now." The service man or department who takes that know-it-all attitude is sending a hand engraved invitation for enough trouble to rub him or it out of the picture. There are no Ifs, Ands, or Buts. Use the right lubricant or get ready for trouble.

To clarify further discussion, two types or classifications of extreme pressure lubricants are in use, each suitable for its own type of gear. In reality three types exist, including an intermediate type; but in this discussion only two will be referred to. One type, which here will be called the High Pressure Lubricant, is suitable for certain types of bevel and other gears which approach but do not reach the hypoid range of pressures. This High Pressure Lubricant is referred to as the mild or non-corrosive type. The other type, which here is called, for convenience, the Extreme Pressure Hypoid Lubricant or sometimes the Hypoid Lubricant, is referred to as the strong or corrosive type, is able to carry the most extreme pressures yet developed in hypoid gears. The mild or High Pressure Lubricant is not suitable or permissible, in any sense, for lubricating the latest type of hypoid gear. This is a fundamental fact, and must not be deviated from, if such gears are to be serviced without trouble.



The hypoid rear axle used on the Cadillac 60 and LaSalle. Cadillac specifies that only a Cadillac-approved hypoid lubricant be used

THE Hypoid Lubricant, the only type suitable for the new, smaller hypoid gears in several new models, is not entirely a lubricant in the conventional sense. It is often referred to as an anti-welding agent, preventing seizure of the metal in gear teeth under the extreme high pressures and resultant temperatures generated at high speeds.

To prevent this welding, which means picking out from teeth faces small particles of metal by the opposing teeth and consequent tooth destruction, a chemical reaction takes place between the strong or corrosive lubricant and the metal of the tooth face, forming a smooth, impervious coating of the metal salt of the two materials, which cannot be torn away immediately, preventing metal-to-metal contact. This coat is renewed as fast as worn away, from the unreacted material in the lubricant. The formation of this coat is indispensable, engineers say, to the safe and continued operation of the hypoid gear. When all the reacting material in the lubricant has been used to form this film or coat, or when the concentration of

1937
WILL SET A NEW HIGH IN EN-AR-CO DEALERS' SALES

THE enviable profit record of En-ar-co Dealers during the past year will unquestionably be exceeded in 1937 . . . . for all the sales co-operation of the past will be continued . . . . giving an unequalled push back of the En-ar-co Line.

The customers attracted by the Advertising are held by the high quality and perfect performance of these great leaders in a great line . . . .

EN-AR-CO MOTOR OIL

Paraffine Base—Wear Proof

EN-AR-CO PENN MOTOR OIL

Pennsylvania Motor Oil at its Best

EN-AR-CO HYPOID LUBRICANT

For Hypoid Rear Axles

Distributors' success must be based on the success of dealers. That is the reason so many alert distributors are swinging to En-ar-co.

We shall be glad to submit to you the complete En-ar-co plan of sales cooperation . . . to show you how it attracts dealers and holds them.

Write us today.

This big, colorful, sturdy and familiar Boy and Slate sign . . . with a new message every other day . . . displayed at the point of sale, will bring to the dealer the full benefit of the powerful, new En-ar-co advertising campaign for 1937.

THE NATIONAL REFINING CO.

Refiner of White Rose Gasoline

HANNA BUILDING CLEVELAND, OHIO

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Peoria, Ill.	Sioux City, Ia.	St. Louis, Mo.
Springfield Ill.	Kalamazoo, Mich.	Omaha, Nebr.
Indianapolis, Ind	Mankato, Minn.	Oklahoma City, Okla.
Dubuque, Ia.	Kansas City, Mo.	Memphis, Tenn.

CAD 8

IMPORTANT NOTICE

To Car Owners

Only Cadillac approved Hypoid Differential Lubricant can be used in the rear axle of this car. Do not permit the use of any other axle lubricant.

This windshield sticker on new cars is one of the many ways in which Cadillac and LaSalle point out the need for proper rear axle lubrication on their models

the reacting material has reached a low value, the lubricant is no longer satisfactory, and must be replaced with new lubricant or the gear fails.

This is the primary reason why hypoid lubricants must be changed at relatively frequent periods, and why disaster is likely to follow failure to change the lubricants at the proper time. The lubricant *can be* used up, that is, the effective portion of it. The gear housing may be full of a liquid or semi-fluid oily material, and yet be entirely unsuitable for its purpose, if the lubricant has been in use too long.

Opinions of technologists are not yet entirely made up as to the likelihood or certainty of trouble resulting from the admixture of hypoid lubricants of different composition in the gear housing. It is considered by many, however, that the use of a different type of lubricant, or a different brand, should be permitted only when the gear has been drained of all old lubricant, completely refilling it with the new type.

HYPOID lubricants of different chemical compositions may contain materials which will react with each other if mixed under the temperature and pressure conditions existing in the gear when operating, or even at atmospheric temperatures. If this occurs, some or all of the material needed to form the Extreme Pressure protective coat will be removed, changed in properties, and possibly precipitated as a new compound from the lubricant, thus effectively destroying the usefulness of the lubricant without any operating life whatever, or with a very short service life. The operator continues to drive the car for the recommended mileage period, with the gravest probability that the gear will fail.

It is considered good practice to clean the gear completely before each refilling with new lubricant. Some lubricants, for example, use lead soaps, considered by many automotive and oil lubrication technologists to be one of the best materials for use in these lubricants. Another type may contain chlorine in some form; under high temperature, it is possible that lead chloride, or a more complex product may be formed if two such lubricants are mixed, resulting in destroying the effectiveness of the lubricants, and a gear failure. In any case, recommendations are that the hypoid gear be cleaned of old lubricant and entirely refilled with new material of a suitable brand. Sulfur, and other reactive materials are incorporated into hypoid lubricants, and are a part of the list of ingredients which make them effective. They must be present in the active form, however, or the desired effect is not obtained, resulting in an unsatisfactory lubricant and damaged gears.

Water must be kept from the gear case where hypoid lubricants are used. Because of the nature of the lubricant, water has a tendency, sometimes very strong, toward inducing separation of the ingredients of the lubricant, with disastrous results. Therefore no water or steam should be used in cleaning the case of old lubricant. Rather kerosine or naphtha should be used to wash the case, eliminating the last traces of liquid by wiping, blowing or both, before new lubricant is added. Hypoid lubricant should not be kept in stock too long, there being of course a tendency to age; data are not yet available to show the length of active life of satisfactory lubricants of this type, although the rate of aging is relatively slow.

Just at present technologists are not always able to predict from the chemical composition of a lubricant whether or not it will be satisfactory as a hypoid extreme pressure lubricating product. In the case of certain specific products laboratory and service tests have shown that these lubricants are satisfactory, and these products are included on the car makers' recommended lists. The final decision appears to be made from the results of service performance of the lubricant in each case, and each manufacturer's product must be tested separately, through an exhaustive routine, before it is proved satisfactory for recommendation to service units.

In the face of this situation, it appears that, next to a suitable system for designation the different types of lubricants for rear axles, the thing most needed is a set or sets of specifications for these lubricants. This problem is so filled with difficulties that suitable specifications have not been standardized. Technologists have not been able to determine or to agree upon proper bases for specifications. Tentative specifications have been worked out by some of the car manufacturers; they insist that these specifications are "tentatively" tentative, are for trial and subject to change in any degree on very short notice.

The main schools of thought exist on the proper basis for specifications. One demands specifications requiring a given chemical composition; another wishes to use performance results as the chief requirement, eliminating the necessity for including any specific chemicals or elements, permitting the lubricant maker to use such chemicals as he finds best for his product, so long as the lubricant gives the proper results in service.

THE tentative specifications referred to specify the nature and amounts of ingredients used in approvable lubricants, but they do not approve the products finally until severe road tests have shown the lubricants to be satisfactory from those results, obtained on each lubricant separately. Lead soap, calculated as lead oxide, is limited in one or two specifications between one and four per cent; sulfur of the active or "added" variety, is specified between 0.75 and 2 per cent. In one specification this maximum must include sulfur, or sulfur plus chlorine.

The lubricant must carry without trouble a load of 550 pounds on the S. A. E. Lubricant Testing Machine under a given set of operating conditions of shaft speed, temperature and rate of adding test load. The operating conditions and maximum load carried are arbitrary, and have been determined by trial, as conditions under which a lubricant showing good results has proved satisfactory in actual service. Viscosities are specified on Saybolt Furol (fuel oil viscosimeter) as 80 to 150 secs. at 100 F.; in another case, at 60 to 90 seconds at 210 F., Saybolt Universal (lubricating oil viscosimeter), and not more than one million seconds at zero, F. Samples must not show a volume increase of more than 100 cc. in a 500 cc. batch after heating and stirring under specified con-

IMPORTANT

ALL 1937 CADILLAC AND LASALLE REAR AXLES REQUIRE A SPECIAL

HYPOID DIFFERENTIAL LUBRICANT

USE ONLY CADILLAC APPROVED HYPOID DIFFERENTIAL LUBRICANTS IN THESE UNITS

DO NOT ADD LUBRICANT TO A DIFFERENTIAL UNLESS POSITIVE THAT UNIT CONTAINS THE SAME BRAND OF CADILLAC APPROVED HYPOID DIFFERENTIAL LUBRICANT

DRAIN, FLUSH and REFILL EVERY 6000 MILES REGARDLESS OF SEASON

The wall card which Cadillac furnished to its dealers, to remind the service men of the importance of proper hypoid lubrication

DRUMS for HYPOID LUBRICANTS

Colorful LITHOGRAPHED GREASE PAILS and DRUMS constantly Advertise Your Product!

YOUR new line of HYPOID GEAR LUBRICANTS require new containers—*sturdy in construction* to safely carry your products—*convenient* to open and close—and *colorfully decorated* to identify your product and keep your Brand Name constantly alive.

Let us help you design a new label for your 25, 50 and 100 lb. packages that will *reflect the fine quality of your greases*—

WRITE FOR COMPLETE INFORMATION AND PRICES.

Benetco Oil and Grease Pails and Drums are constructed to MORE than take the hard knocks of shipping and handling—and they are ALWAYS COMPETITIVELY PRICED.

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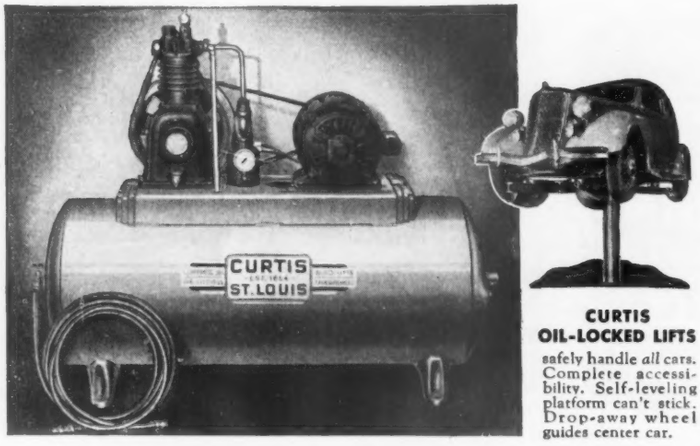


CURTIS OIL-LOCKED LIFTS
safely handle *all* cars. Complete accessibility. Self-leveling platform can't stick. Drop-away wheel guides center car.

Curtis Compressors have been known for their dependable performance for 43 years. Now, a completely restyled line offers NEW BEAUTY as well as improved efficiency.

• *Appearance*—New symmetry—added eye appeal. Finer finish—black, red, and gold. Simplified, clean-cut, modernistic design.

• *Performance*—Positive centrifugal unloader – no starting load – Timken bearings – less friction, adjustable—Centro-ring oiling – positive lubrication—"V"-belt drives—quiet, trouble-free, plus other mechanical refinements—giving increased efficiency, longer life, lower operating costs.

CURTIS PNEUMATIC MACHINERY CO.
1965 Kienlen Avenue, St. Louis, Missouri
New York — Chicago — San Francisco

CURTIS

ditions and standing afterward for an hour. Certain other requirements of settling, evaporation and segregation in storage are specified by the automotive engineers.

Emphasis must be placed again on the tentativeness of these specifications. They are in reality merely working models, set up for trial to determine by means of research and experience how these laboratory requirements may be correlated with service results. Service tests are still the controlling factor in acceptance or rejection of a given product. The specifications may be, and doubtless will be changed to any degree which experience shows to be an improvement, and are not to be taken in any manner as representing a standard arrangement, automotive engineers insist.

If service tests are the final and overruling criterion of hypoid lubricant quality and suitability, then these lubricants should be specified on a basis of performance entirely, many technologists, especially refining technologists, insist. Limitation of the chemical ingredients to a specified small number of material cannot determine the quality of the lubricant, they point out; therefore there exists insufficient reason for placing this limitation on makers of these lubricants. Such a limitation tends to discourage experiment, they state, and to prevent the development of new and probably better types of products. They point out the axiom of specification building; that a requirement has no place in a specification if it limits development, or if it has little if any effect on the quality of the product specified. Therefore, if performance is the all-important measure of hypoid lubricant quality—and the truth of this is obvious, they affirm—then performance specifications are all that we need to determine and limit the satisfactory qualities of these lubricants.

Some time will be required to work out these problems; the answers are not all self-evident to all interested organizations. The absolute necessity for the observance of the safeguards outlined to service units, however, leave no room for doubt, or for laxity in their observance. If these precautions are not observed carefully and unanimously, serious trouble is more than likely to follow, trouble for which either oil company or automotive builders will be blamed, and the costs are likely to be too high to be excusable.

MARTIN DENNIS
ANIMAL OILS

Purity • Uniformity • Quality

One of our outstanding Lard Oils is SPECIAL PRIME WINTER STRAINED LARD OIL.

Specifications:

F. F. A.	maximum ½ of 1%
POUR TEST	maximum 30° F.
COLOR	Water White

Samples and complete specifications on request.

OIL DIVISION

THE MARTIN DENNIS COMPANY
859 Summer Ave., Newark, N. J.

"Hollywood Lights"

Open Station

A typical Hollywood opening, with all the trimmings, was the method used by H. H. Purdy, a Cities Service distributor, when he recently introduced a new station to the people of Port Huron, Mich.

The station, located in the downtown section, drew curious people from all over town on the opening night, as two large searchlights at the station played on the sky. Augmenting the searchlights, three arc lights were used to light up the station itself, and phonograph records were broadcast through a loud speaker arrangement.

Everyone who was attracted to the

opening of the station, whether a customer or not, was given a souvenir—roses for the ladies and cigars for the men.

Prior to the opening, a ¼-page advertisement appeared in one of the local newspapers and a series of 6 one-inch teaser ads in another paper; and two days before the announcement date a large banner was strung up across the main street calling attention to the new station about to open.

All afternoon before the formal evening ceremony, Purdy kept himself busy at the telephone, calling friends and urging them to drop in that evening. According to Purdy, his friends responded in large numbers, and he estimates that 40 per cent of the 1152-gallon total business on the first day was from those who came in and asked for him personally.

"Some people came in on Sunday and Monday, apologizing for not being in at the opening Saturday", Purdy said.

Not being a man to rest on his laurels, Purdy is following up now by telephone and by personal calls.

Nov. Pump Shipments Total 9022

N. P. N. News Bureau

WASHINGTON, Jan. 12.—Gasoline pump shipments in November lagged slightly behind those for October, but were well in advance of those in November 1935, according to figures released by the Census Bureau.

Total value of pumps shipped in November was $1,700,434 compared with $1,778,616 in October and $979,398 in November 1935. The figures are for 30 manufacturers representing more than 90 per cent of the industry, the bureau said.

Pumps shipped in November numbered 9022, of which 8286 were power operated and 6793 computing.

Oil and grease equipment and other measuring and dispensing pumps shipped in November were valued at $147,782, compared with shipments valued at $109,320 in November 1935.

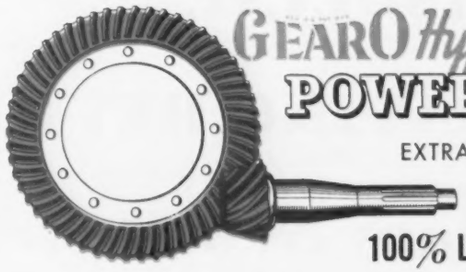
Buses Thrived in 1935, Census Figures Show

WASHINGTON, Jan. 9. — Motorbus transportation, youthful industry that it is, grossed almost $166,000,000 in 1935, according to business census figures released today at the Commerce Department. The business was done by 1751 motorbus concerns operating 19,182 buses as common carriers.

This figure does not include sightseeing, chartered or school bus lines, nor does it comprehend bus lines operated by municipalities, electric railway companies or their subsidiaries, or steam railroads.

The 1751 concerns employed a total of 39,613 persons (monthly average) with an annual payroll of $55,267,000.

From the House of Lubrication
SINCE 1904



GEARO Hypoid LUBE
POWERFUL E.P.
EXTRA CAPACITY
100% LUBRICATIONABILITY
WHERE GEARO HYPOID SHOULD BE USED
AMERICAN OIL & GREASE CORPORATION
201 North Wells Street CHICAGO, ILL. Phone Randolph 9371

OVER 60% OF THE 1937 CARS
Require the All-powerful E. P. Lubricants

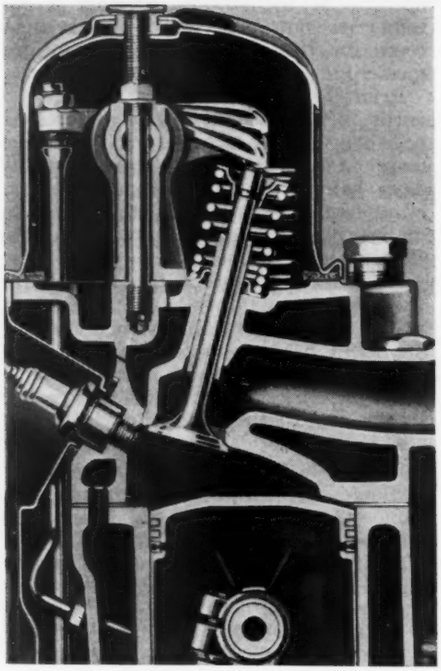
In LETTERS, The Story Is Told!

G as G in GearO-HYPOID-Lube, the POWERFUL E. P. Lubricant.
E as E in Economy—most important!
A as A in Adaptability for all makes of cars, buses, trucks and tractors.
R as R in Reliability, the first consideration.
O as O in Outstanding in Safety and Performance.
H as H in High pressure, remaining on gear teeth.
Y as Y in Yes, it's O. K. it being a superlubricant.
P as P in POWERFUL, as understood and prescribed by auto engineers
O as O in Oiliness, as Lubricity is necessary.
I as I in Inexpensive; the price is reasonable.
D as D in Dependability, which is essential.
L as L in Long Life with lubricationability.
U as U in Ultra, it being the last word in hypoid gear lubrication.
B as B in Balanced, it being a truly tempered lubricant.
E as E in Efficiency, with a film strength to stand full load on S.A.E. Machine.

THERE CAN BE NO COMPROMISE
Use GearO-HYPOID-Lube and Be Safe!

ASK NOW ABOUT
DISTRIBUTION & SALES FRANCHISE
FOR YOUR TERRITORY

GASOLINE AND OIL SAVING DEVICES Used on Many New Models



The redesigned Chevrolet combustion chamber makes possible more complete burning of the fuel. The pistons are beveled to make the chamber more compact

YEAR to year improvements in automobile engines bring to the front many brain-children of the automotive engineers, results of their ceaseless efforts to reduce oil and gasoline consumption. More power with less fuel, and a minimization of oil consumption are forever on the minds of those who design the cars we ride in.

Viewing the 1937 cars, it is noted that power increases have been made by boosting the engine sizes on the small Buicks, Oldsmobile, LaFayette, Pontiac, Chrysler Six, and DeSoto.

Other 1937 cars, such as the large Buicks, Cord, Graham, Hudson, and Terraplane, have increased their power by improved manifolding and carburetion, supercharging, increased compression ratio to permit more efficient burning of standard fuels, improved valves, larger intake and exhaust passages, and better cooling.

The transmission overdrive, which makes possible a reduction of engine speed to drive shaft speed at car speeds of 35 to 45 miles per hour and over, brings about a substantial saving in gasoline consumption at higher speeds. This feature is offered as optional equipment this year on Chrysler, Graham, LaFayette, DeSoto, Nash, and Studebaker. It is standard on the Cord and Pierce Arrow.

The 1937 models also offer many improvements in fuel and oil pumps, carburetors, and cylinder wall lubricating methods, which bring the engines closer to the ever elusive goal of more power on less gasoline and oil.

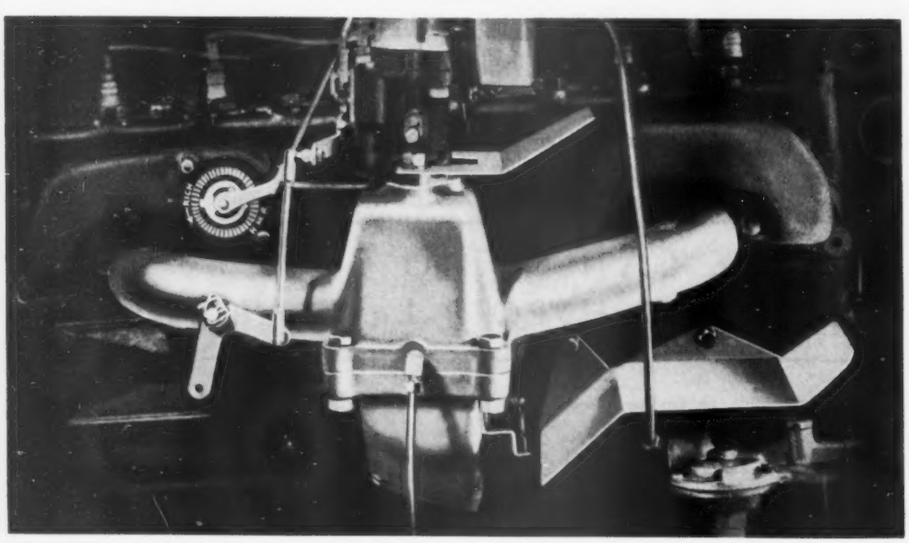
The automatic choke is coming into more general use, being employed on 30 of the 47 new models. This device protects the car owner against the excessive use of fuel from too rich a mixture, particularly in starting. This choke is usually operated through a thermostatic arrangement in which the engine heat controls the opening and closing of the choke valve.

The octane selector, full length water jackets, and thermostatic control of water circulation are also finding increasing use as agents for more economical fuel and oil consumption.

Automatic heat control is quite generally used on the 1937 cars. This unit, usually on the intake manifold, quickly warms up the intake manifold riser in cold weather operation and maintains the efficient temperature of the manifold under all driving conditions. It serves to preheat and vaporize the incoming gas, resulting in a saving in fuel consumption.

The automatic choke on the 1937 Buick provides for automatic de-flooding, enabling the operator to start the engine regardless of the volatility of the fuel or of the setting of the octane selector. Buick has discontinued the use of the oil filter, and now uses a floating oil pump screen hinged at the lower end of the oil pump inside the crankcase where it floats on the oil's surface whatever the level.

Buick uses a dual float, single bowl carburetor of the dual downdraft type. Its principal feature is the design and location of the bowl and float mechanism, which provides a constant supply of mixture to the cylinders regardless of the angle of the level of the fuel in the bowl when subjected to violent changes of direction or velocity.



Fuel pump and carburetor are shielded from the manifold heat on the new Studebakers

CADILLAC and LaSalle, with an increase in engine power, have been able to reduce the axle ratio to effect an increase in fuel and oil economy. Pistons of the 1937 LaSalle travel 2100 feet while the car travels one mile, while the 1936 pistons over the same car distance traveled 2360 feet, with the result that there is a bonus of almost one mile in reduced engine wear for every 10 miles the car is driven.

Fins in the intake manifold of the 1937 Chevrolet improve the mixture distribution to the two cylinders at each end of the engine, and an exhaust-gas-heated hot spot hastens vaporization. With the new center exhaust outlet, all the hot exhaust gas from all cylinders passes through the fuel-mixture warming chamber so that a warm mixture is supplied almost as soon as the engine is started.

The Chevrolet light-weight pistons have a beveled roof, permitting a more compact combustion chamber and eliminate the pocket over the side opposite the plug.

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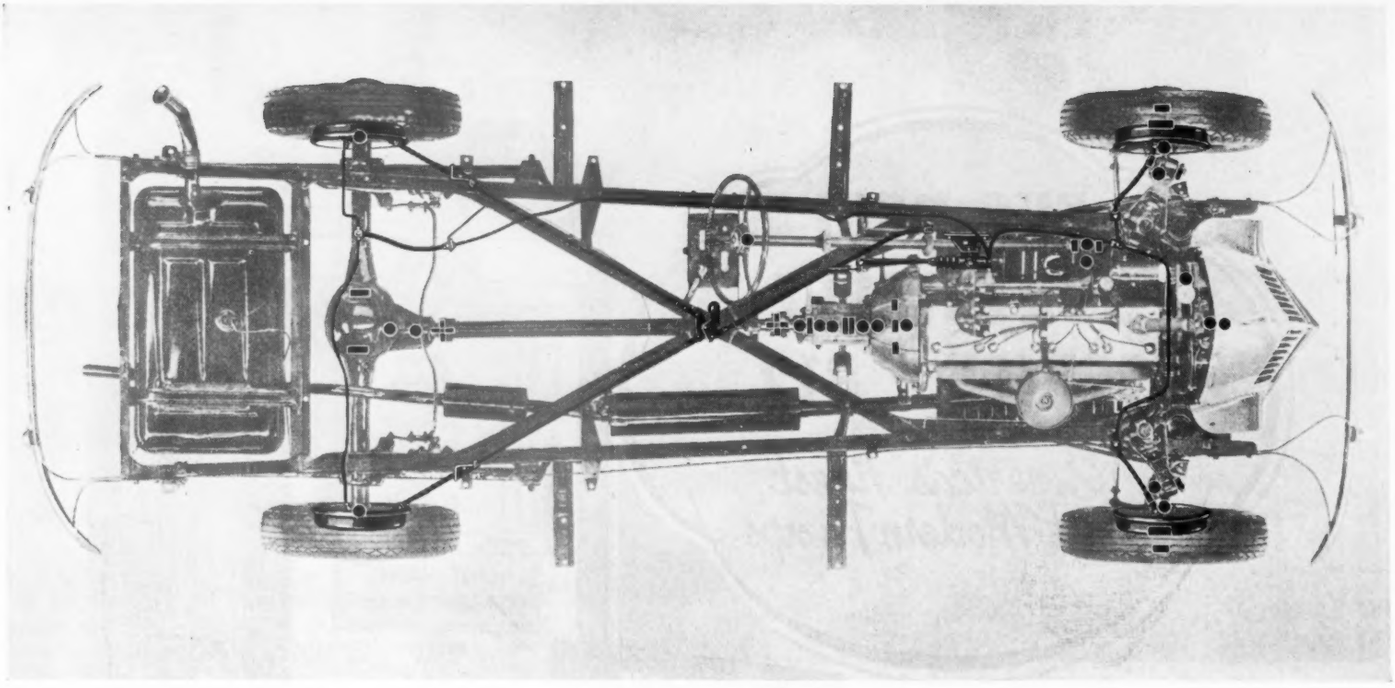


Packard makes liberal use of ball and roller bearings to insure effortless operation

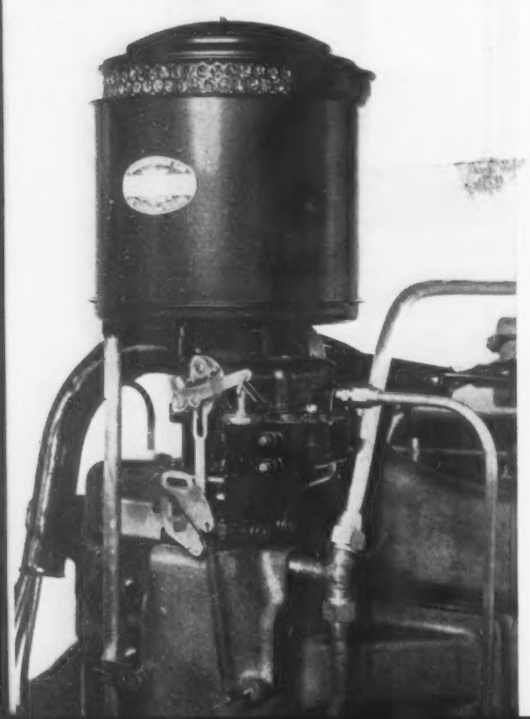
The shape of the combustion chamber promotes a complete burning of the fuel mixture, Chevrolet claims, with a resulting improvement in fuel economy.

New features on the Dodge and DeSoto engine include larger valves and improved valve ports, a four-ring aluminum pistons, austenitic steel exhaust valves, and symmetrical connecting rods.

The supercharger is found on two Graham models for 1937. This unit turns at approximately 23,000 r.p.m. when the engine is turning 4000. It takes the carburetor mixture, "scrubs" it to a fine mist, brings it to an even temperature, and "packs" it into all cylinders evenly at about 5 pounds above atmospheric pressure. This results in an extremely high ratio of power to engine weight combined with an increased fuel economy.

The Graham pistons are lubricated by a metered flow of oil that is by-passed in a circumferential relief in the valve tappet from a supply port to a groove near the bottom of the piston skirt. A vertical groove controls the length of time the piston is in communication with the pressure line, and an air vent hole on the opposite side makes possible the flow of cold oil around to that point quickly. With this system it is claimed that 1000 to 1200 miles per quart of oil are possible.

The Hudson double carburetor. Two jets furnish the mixture—one to the forward cylinders and the other to the rear



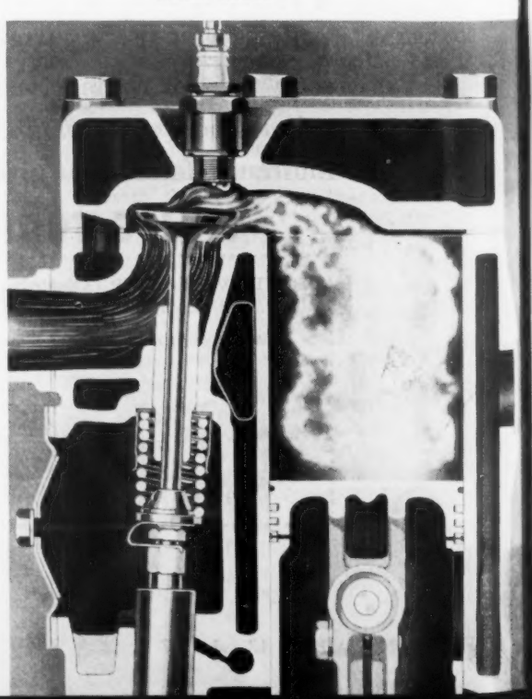
THE Hudson models and the Super-Terraplane are equipped with dual down draft carburetor and new manifold arrangement that is claimed by the company to effect a 10 per cent increase in fuel economy. This improvement is said to bring about a more uniform distribution of the fuel mixture. One of the two carburetor barrels feeds the 4 center cylinders on the 8-cylinder models, and the other barrel feeds the 4 outside cylinders. On the 6-cylinder models, one barrel feeds to cylinders 1, 2, and 3, and the other barrel feeds to cylinders 4, 5, and 6. Both barrels of the carburetor operate from a single float chamber. The carburetor is provided with an anti-percolating device and an unloader in the intake manifold which permits of de-flooding by opening the throttle wide.

Despite the increased power of the 1937 Oldsmobile engines, an improvement in fuel economy is claimed largely through improvement in the carburetion and manifold system. In the new engines, automatic control is maintained over the operation of the choke, the spark advance, idling speed, and the temperature of the engine and of the fuel mixture. Full-length water jackets completely surround each cylinder, and direct "pipe line" cooling is provided for the exhaust valves. This efficient dissipation of heat, coupled with the relatively low operating speed, provide greater fuel and oil economy.

In actual driving tests Packard claims a 200 per cent improvement in oil economy at 75 miles per hour and less oil consumption at 35,000 miles than at 10,000 miles. Largely responsible for this showing are the oil and compression piston rings. These rings utilize a series of independent double leaf spring units equally spaced on a carrier band, with the band opening opposite the ring gap. This design maintains a uniform pressure against the cylinder walls.

A slight change in the position of the steel riser portion of the intake manifold on the Pontiac is the chief factor in a more uniform fuel distribution, lower vapor richness, and more efficient combus-

Unrestricted passage in the head over the valves on the Studebaker allows a greater quantity of mixture to flow into each cylinder during the intake stroke



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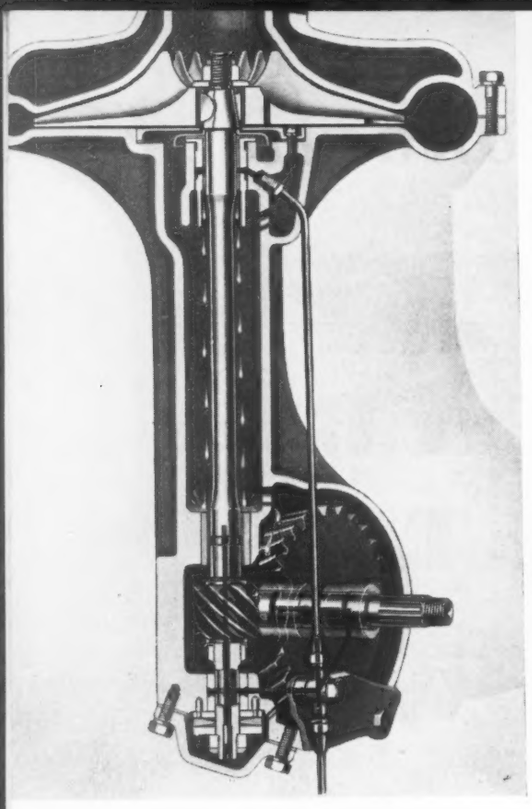

Cutaway section of the supercharger used on two 1937 Grahams

tion. Variation in gas distribution between cylinders has been reduced.

The Pontiac's manifold steel riser and raw fuel vaporizer generates heat quickly. An economizer is also employed, which restricts the flow of fuel up to 65 miles per hour. Other economy devices on the Pontiac include a new location of the spark plugs over the intake valves and a thermostatically controlled butterfly valve in the exhaust manifold outlet, which diverts the exhaust gas, directing it around the thin steel riser tube for preheating the fuel vapor.

An oil filter, which forces the oil through tightly compressed cotton waste, is standard equipment on all 1937 Studebakers. If a new filter cartridge is installed whenever the dip-stick shows the oil to be dirty, it is recommended that the oil be changed only twice a year for seasonal change.

Studebaker has taken other precautions to insure economical operation. The fuel pump and carburetor are shielded against the heat of the manifold; to prevent vapor lock, the fuel lines are carried from the tank along the outside of the frame to the front end, where they pass over the frame to the pump; choke and heat control are automatically operated; and a pocket in the manifold automatically drains off any raw fuel through a drain tube.

The new Willys has an improved carburetor provided with an automatic velocity control. This gives smoother operation at idling and road speeds and results in an increase in economy. A new type fuel pump has an inverted bowl, and has been moved up into the air stream of the fan to provide cooler operation and to reduce the hazard of vapor lock and percolation.

The damper-type piston ring to which Packard attributes much of its success in low oil consumption

WHY HYPOID GEARS ARE USED

By A. LUDLOW CLAYDEN*

A WELL-KNOWN oil company lubrication engineer explains in simple terms the various types of rear axle gears that have been used in automobiles, why the hypoid gear has been adopted now and the problem of lubricating it properly.

THE whole reason for the existence of hypoid gearing is the very natural public desire for noiseless transmission of power. The originally straight toothed bevel gear could be made quiet, but only at great expense. In order to get a speed reduction or rear axle ratio of something over four to one, it was necessary that the pinion should be fairly small, as otherwise the ring gear reached diameters necessitating a very clumsy axle housing.

In a straight bevel, the load is carried, at least theoretically, by more than one tooth at a time and the larger the pinion, the greater the number of teeth which might be sharing the load. However, since the teeth are straight, they come into contact over their entire length at the same instant, which means that unless all the teeth are of precisely the same size they will not engage equally and to get straight teeth to a sufficient degree of precision for really quiet running has, I believe, never been done, except by very careful and, therefore, costly handwork. For example, in the old Rolls Royce plant several days might be occupied in finishing a single pair of gears.

Just the same thing is true of the usual straight-toothed gear and pinion, such as were employed for old designs of transmissions, but in other machine fields it had long been the practice to improve quietness on spur gears by cutting the tooth diagonally, instead of straight across the face of gear. This was more quiet because the tooth no longer engages all across its width at once but the two gears roll into mesh with each other and roll out, a larger number of teeth sharing the load between them and the shock of engagement, as the teeth come towards each other, is very much reduced. This, of course, means that for the same degree of accuracy of finish, a spur gear with helical teeth is inherently more quiet than one with straight teeth.

Of course, today nearly all transmissions are made with helical gears. As long as the public was satisfied with the old system of gear shifting, which really did need considerable skill, the straight-tooth gear remained much the cheapest design. However, the demand for improved shifting mechanisms, occuring simultaneously with the demand for better quietness, led to the type of transmission practically universal today.

Many years ago it was realized that the same principle could be applied to a bevel gear; that is, if a bevel gear could be made with diagonal teeth, just like a helical spur gear, it would naturally operate more quietly. The problem was how to cut such a gear. Bevel gears with straight teeth set at an angle have been made, but never to the best of my belief were they used in any production design. It was the invention of the Gleason machine for cutting bevel gears with curved teeth, which provided the answer, at least to the first stage, in solving the problem.

The curved teeth of a spiral bevel gear, of course, behaves in very much the same way as the straight but sloping tooth on a helical spur gear. As the gears roll together, the load passes from one end of the tooth to the other and a number of teeth are in engagement simultaneously. The spiral bevel, therefore, could be made, without hand-finishing, to operate quietly enough to completely satisfy the public demand.

BEFORE the invention of the spiral bevel, a great many attempts had been made to use worm gears. Of course, a worm gear is simply a screw thread. The worm itself has a thread exactly the same principle as the thread on a bolt. The thread on the worm wheel is just like the thread inside a nut, except for the fact that it is cut around the edge of a circle. There is, however, a fundamental difference between the action of a bevel gear tooth and the action of a thread in a worm gear. If you imagine two blank spur gears which would be just discs of steel mounted on shafts and pressed gently against each other, then turning one would cause the other to turn. If there were not much resistance, the surfaces would roll over each other just as a wheel rolls along a rail. Gear teeth are cut in such a shape that they also only roll against each other, so that in conventional spur and bevel gearing, there is no rubbing of the teeth against each other.

On the other hand, in a worm gear there is no rolling. Imagine a plain piece of steel like a bolt but without a thread and another piece fitting it, like a nut, but also without a thread; the bolt is turned inside the nut and the surfaces slide over each other just as occurs in a shaft and its bearing. If now we cut a series of V-shaped grooves in the bolt and form a corresponding series of ridges in the nut and again turn one on the other, we have not altered the nature of the motion. It is still all sliding of one surface over the other. The threads of a bolt, when turned,

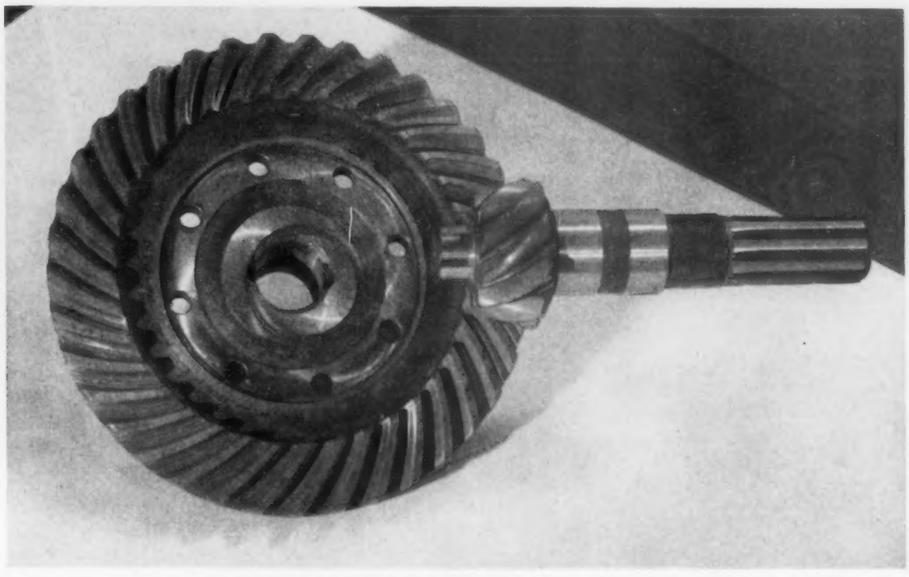

Fig. 1—The spiral bevel gear

*Sun Oil Co., Philadelphia, Pa.

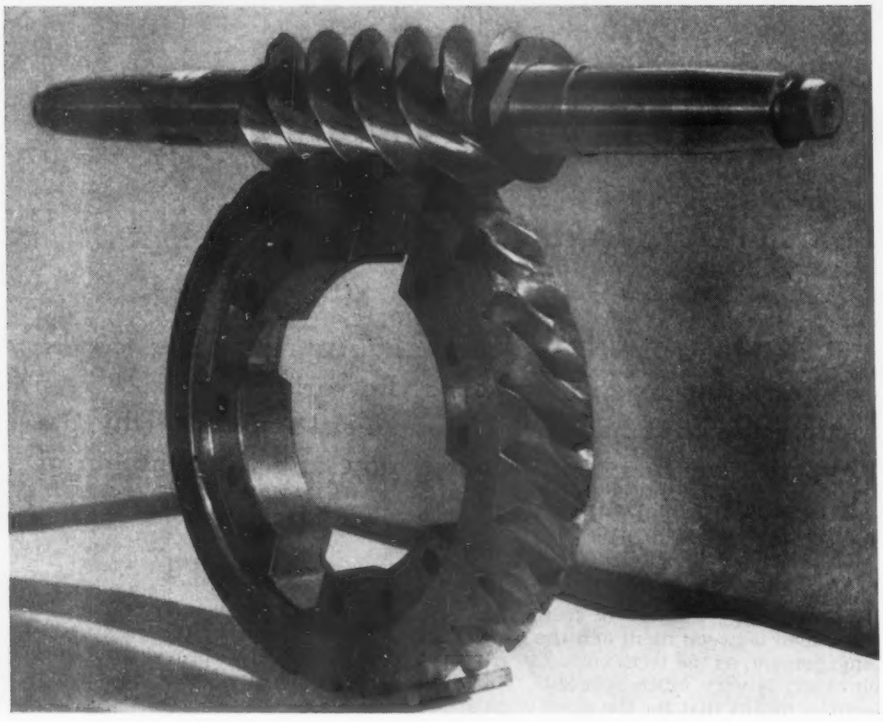

Fig. 2—The worm gear

slide over the threads in a nut and the same thing happens in a worm gear.

Now, sliding two pieces of metal against each other creates friction, whereas rolling them against each other does not. A trolley wheel lasts a very long time, rolling over the rails carrying a very heavy load, but if the same wheel is skidded only a few yards, by too vigorous braking, a flat spot is developed. The wheel which will carry the load easily as long as it rolls, starts to wear very rapidly as soon as it slides.

This, of course, means that, in the design of machines, we have to use much lighter loading for sliding surfaces than for rolling ones. A roller bearing will safely carry a load and sustain a speed which could only be carried by a plain bearing a very great deal larger. Therefore, worm gears have to have much more tooth surface than other types of gear, because the worm gear slides instead of rolling.

Furthermore, metals of the same sort make a poor bearing combination. A steel shaft in a steel bushing is very difficult to keep from seizing. Thus, it is not practical to use a steel worm against a steel wheel. The only alternative is to use bronze for the wheel and bronze cannot be made hard enough to carry as heavy a pressure as the steel from which gear teeth are cut. So, a worm gear of necessity has to be somewhat larger and somewhat heavier than a bevel or gear for transmitting the same amount of power. Another disadvantage of the worm gear is that it is less efficient than the bevel gear at moderately low speeds. At very high speeds a worm gear can be quite efficient, but as the speed falls, more and more power is wasted by friction and this is not the case with the bevel type of gearing.

The automobile industry got along for many years with the spiral bevel. Worm gear development for passenger car use practically stopped, but meanwhile other changes were taking place in automobiles. The principal change was a very great increase in engine power and a corresponding increase in speed. Smaller engines running much faster required increasing the gear reduction in the rear axle. The increasing power was year by year increasing the load on the axle gears and in the last few years the point has been reached where even the spiral bevel was tending to become inconveniently large and heavy.

It was mentioned that, to get reasonable quietness with a straight bevel gear, the teeth had to be of extreme accuracy and to this should be added that the mounting of the pinion and gear likewise had to be very precise and very rigid. The spiral bevel was not as sensitive to extreme perfection of tooth form, but still would not be perfectly quiet unless adjusted with quite a high degree of accuracy. A spiral bevel could thus become noisy after considerable use and in the original factory assembly had to be adjusted quite carefully.

Very little thought is given to axle gearing by automobile users and not very much thought is given to it by the majority of automobile engineers, whose attention has been concentrated all the time on engines and with brakes, steering, springs and improved shifting mechanisms, as a series of following developments of the last 15 years. However, through all this time a small group of gear engineers have had before them the possible ideal of a form of gearing combination with the natural advantages of the bevel, and with the natural advantages of the worm, meanwhile avoiding the drawbacks of either, and it is the work of this group that has led to the development of hypoid gears. Tabulating the advantages of hypoid gearing they are:

1. Inherent quietness, better than the spiral bevel; in fact, approaching that of the worm.

2. Lesser sensitivity to accuracy in mounting or adjustment.

3. Smaller size in proportion to load than either spiral bevel or worm.

4. Somewhat lower cost due to Items Nos. 2 and 3.

5. Lowering the propeller shaft.

Of course, bringing the shaft nearer the ground is the only advantage immediately appreciated by the car users, because it permits the use of a low floor without the shaft tunnel. If, however, this had been the only advantage of hypoid gearing, it is very improbable that it would have been adopted as fast as has been the case, but the combination of all five points presents an irresistible argument to the car manufacturer.

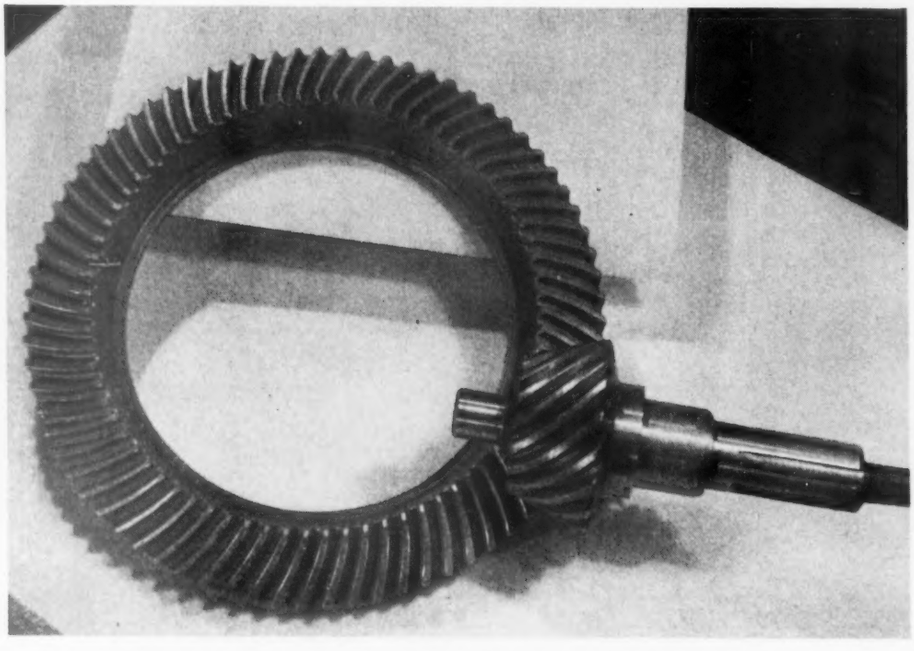

Fig. 3—The hypoid gear

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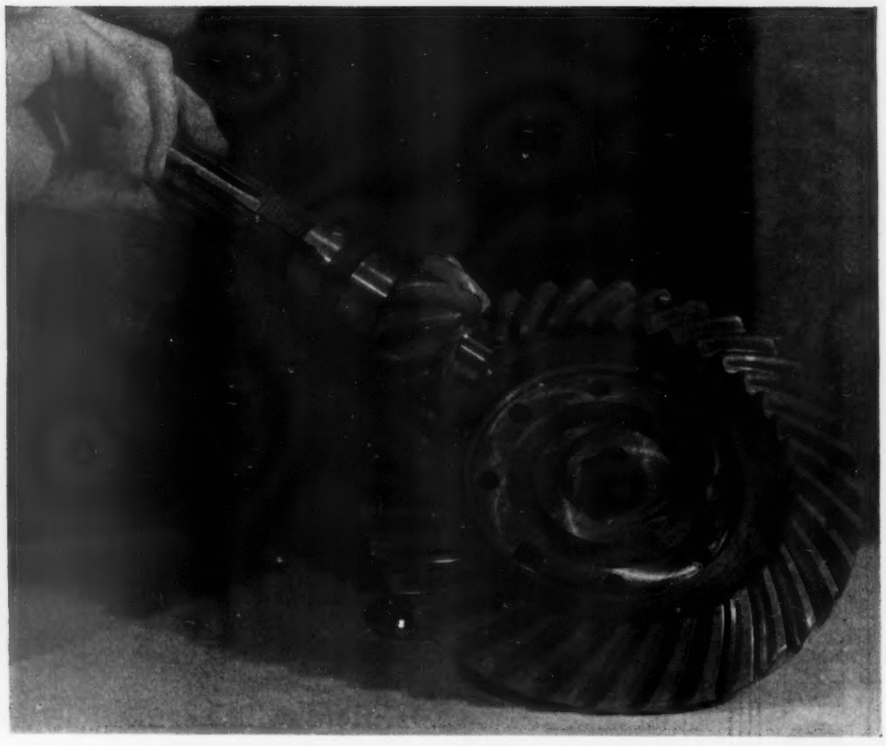

Fig. 4—When the pinion shaft of this spiral bevel gear is gently turned the pinion gear will roll all the way around the ring gear and come back to its starting point

Against these five advantages is the single drawback that the hypoid gear will not function except with a powerful e.p. lubricant. This is because being part way between the spiral bevel and the worm, the motion of the teeth against each other is likewise part way; that is to say, partly rolling and partly sliding. For the rolling portion of the motion, considered alone, any lubricant satisfactory for a spiral bevel could be used but for the sliding part of the motion, an oil satisfactory for a worm gear could not be used. This is because the pressures are higher than in a worm gear and because steel against steel is a very poor sliding combination; whereas steel against bronze is a good one. We could not use a bronze

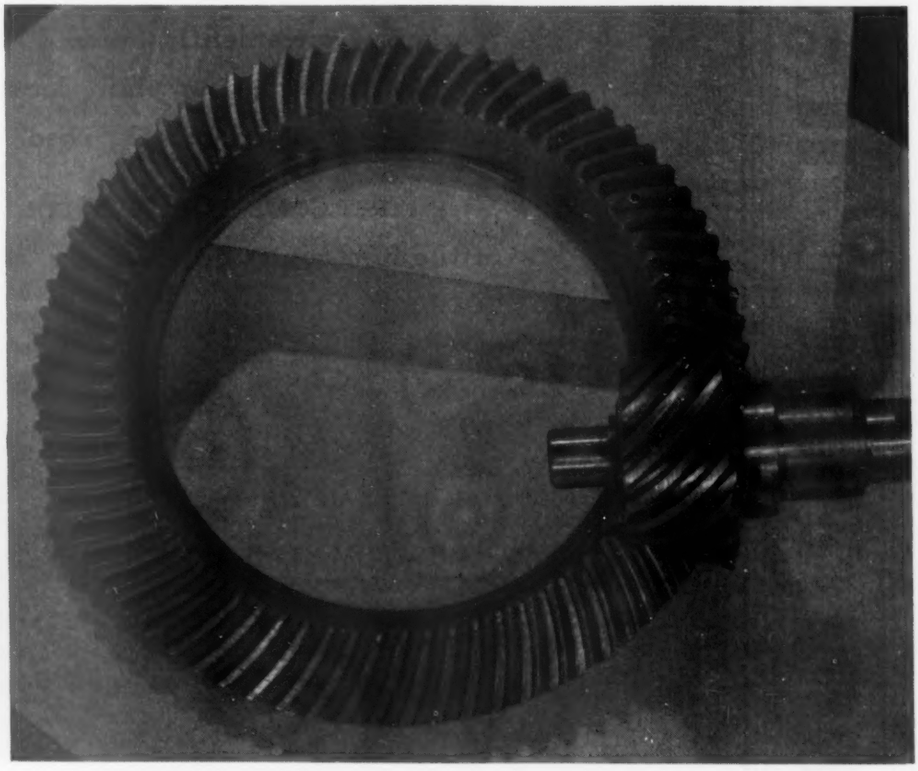

Fig. 5—When the pinion shaft of this hypoid gear is turned gently to the right, as shown in the photograph, it will roll toward the center of the ring gear, and will eventually fall off the ring gear. This illustrates that for the hypoid gear and pinion to hold their relative positions, a certain amount of sliding action of the teeth must accompany the rolling action

ring gear for a hypoid because the teeth would not be nearly strong enough, therefore, the only alternative is to use lubricant of an entirely special nature.

A combination of rolling and sliding movement is not perhaps too easy to visualize. Perhaps the simplest illustration is a skidding automobile wheel, which is rolling forward and sliding sideways simultaneously. On a wet surface a little sideways sliding of a tire on a road does not damage the tire. However, in racing for instance where it is often necessary to skid around turns, the amount of wear is quite large. In other words, as the tire is rolling, the wear is negligible, but as soon as it begins to slide, the wear is considerable.

The illustrations first of all show the three types of gear; Figures 1, 2 and 3. The other two illustrations, Figures 4 and 5, will possibly show the difference between the action of the three gear types.

In Figure No. 4 is shown a spiral bevel combination without any mounting and it may be imagined that the ring gear is lying on a table. If then the pinion is held lightly and gently turned, great care being taken that it is neither pushed nor pulled then the pinion could be rolled all the way around the ring, gear and would come back to its starting point.

Now, if the same experiment is tried with a hypoid gear, instead of the pinion rolling around the ring gear, it immediately rolls off it. In figure No. 5 right hand rotation has been applied to the pinion and as shown the pinion is rolling toward the center of the ring gear and, if turned a little further, would fall completely off the ring. Now, by pulling on the end of the shaft, the hypoid pinion will slide back into place, so that we could roll the pinion all around the ring gear if we continually pulled on the end of the shaft. The effect of this pulling, of course, would be to *slide* the pinion back onto the gear as fast as it tried to roll off the gear.

Italy Tries Methane As Motor Fuel

WASHINGTON, Jan. 7. — Italians, struggling for motor fuel self-sufficiency, are experimenting with methane in road tests of vehicles to determine its practical utility. Results thus far are reported satisfactory, according to advices from the American consul at Milan.

Weight of the steel cylinder containers is the chief disadvantage but effort is being made to make aluminum containers legal and to further reduce handling charges by construction of a pipeline system.

Adaptation of vehicles for the use of methane is said to be simple, consisting of the substitution of a pressure-reducer and an air-mixer for the ordinary carburetor and of a gas container for the usual gasoline tank.

Methane is said to be much cheaper than gasoline at the present 40 cents per gallon. Methane is 7 cents per cubic meter which is equivalent to 2.4 pints of gasoline. Thus, methane to furnish the same power as a gallon of gasoline would cost the Italian motorist less than 23 cents plus transportation costs.

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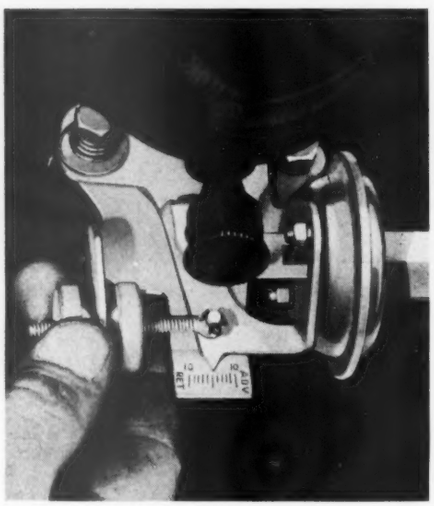
A LUBRICATION ENGINEER Checks the 1937 Cars

By C. M. LARSON*

BUT for a deluge of hypoid gearing in rear axles, there are no marked changes in the details affecting the fuel and lubrication requirements of the 1937 passenger cars. However, the attention given to the details have contributed to a large extent to fuel and lubrication economy and the service station attendant needs to follow his lubrication charts with exactness if he would be in the class of a professional man and keep the car owner out of trouble.

Improved carburetion and manifolding, more efficient combustion chambers and the use of the over-drive transmission all extend the mileage of gasoline. To offset this, the rapid growth in the use of the passenger car trailer, because of the added load, will increase the gasoline consumption of cars so equipped by some ten per cent.

More attention has been given to reduction of detonation by the use of vacuum spark control. On some of the new cars the fuel pumps are moved to cooler locations to reduce the tendency towards vapor locking in hot weather.



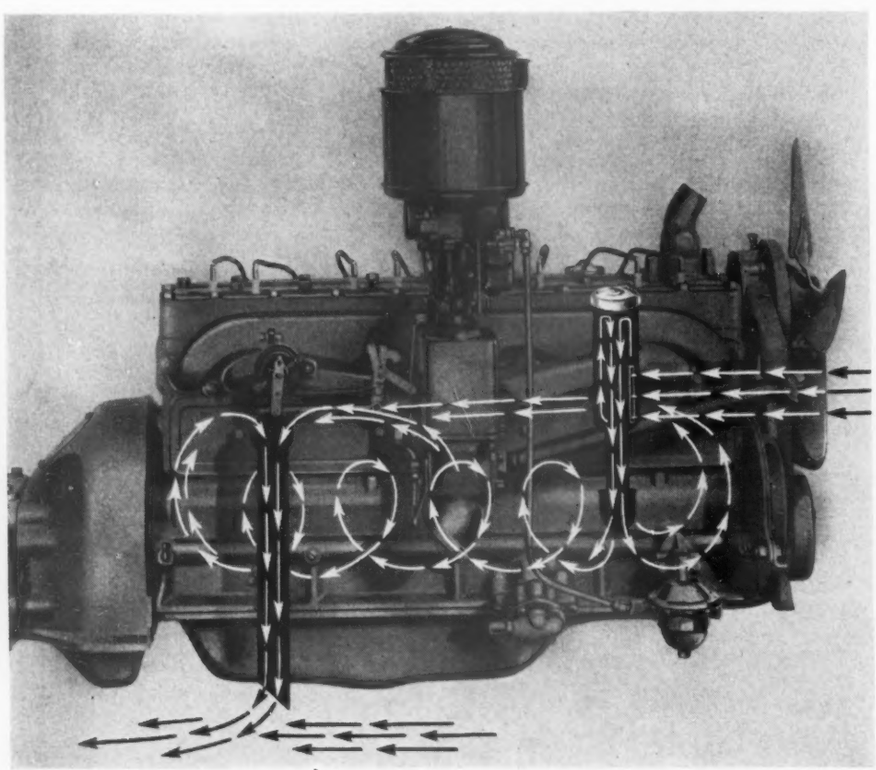
The 1937 Chevrolet octane selector permits setting the distributor timing to get the most out of any grade of fuel

The general trend toward motor oils of lighter body than SAE 40 and SAE 50 is made possible through the use of improved pistons and rings. Modern ring design controls the oil consumption satisfactorily even with the lighter grades such as SAE 20-W and SAE 30. It is regretted that the Ford and Lincoln Zephyr could not have reduced their recommendation one grade.

REAR axle design is marked by the use of hypoid gears in all price classes. Hypoid gears run quietly and allow lower propeller shafts. This does away with the tunnel in the rear floor and cuts production costs of gearing. However, the hypoid gear teeth combine rolling and sliding motion under high pressures and require for satisfactory lubrication a very efficient and active type of hypoid lubricant.

In the Fall of 1936, Chevrolet, Buick, Cadillac, Chrysler, LaSalle, Plymouth and Studebaker introduced hypoid rear axles in their 1937 cars. The requirements of two of these makes of cars, equipped with hypoids, call for a drive-away fill with an e.p. lubricant, far in excess of that marketed through service stations or car dealer outlets. It was hoped that, after the initial draining at 5000 miles, the hypoids would lap in sufficiently to allow the subsequent use of high grade commercial e.p. hypoid gear oils. But such is not the case. A powerful active type of hypoid lubricant had to be developed to take care of the high rubbing speeds.

In building up a powerful hypoid e.p. gear lubricant, the selection of the proper mineral oil is essential. The SAE 90 grade, which is used for both summer and winter temperatures, has to be considered at Zero degrees F. as well as at its SAE index temperature of 100°F. if absence of drag in the rear end is to be avoided. It is easy to start with a high sulphur Smackover black oil product, but then the stability in service and the settling out



The 1937 Pontiac 8 engine, showing how pressure-suction crankcase ventilation is induced

*Supervising Engineer, Sinclair Refining Co., New York.

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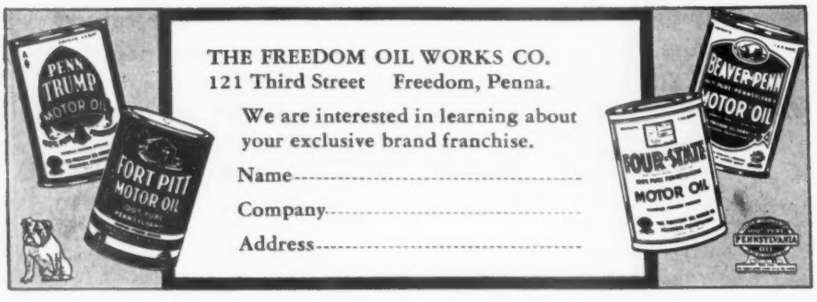

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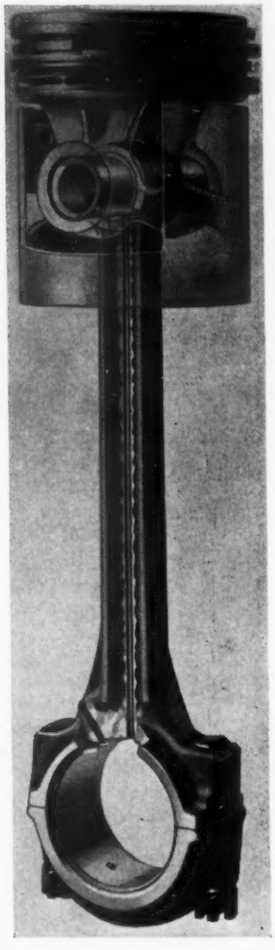
in the containers is found objectionable. This objectionable feature is increased with the use of lead e.p. bases. It is much harder to keep the lead ingredients in suspension when Mid-Continent or Pennsylvania bright stock blends are used, but the stability in service is greatly improved.

Whether a lead oleate or a lead naphthenate is used is somewhat a divided opinion, but to meet the oven test



Rifle-bored connecting rods, providing pressure lubrication to the piston pins, are featured on 1937 Nash LaFayette models

of Packard, lead naphthenate has to be used. However, leaded products at high operating temperatures induce thickening and more frequent draining of the rear axle.

High sulphur content is very important to make the high film strength hypoid lubricants. Active sulphur is very necessary to avoid scuffing. As the sulphur content is increased, the operating temperature increases due to increased frictional drag. Saponifiable oils tend to keep the temperature down but lessen the sulphur activity.

The service station needs are best filled by the fewest number of grades as inventories and especially grease dispensing equipment (metered) are costly. Experience has shown that it is necessary to put the lubrication station entirely on approved powerful hypoid gear lubricants for hypoid rear axles, where the bronze

thrust bearings are made from an alloy which will resist the increased chemical activity. All transmissions, old or new cars, can be filled with commercial e.p. gear lubricants as well as differentials of cars not equipped with hypoids. The exception to this is the over-drive cars or those equipped with free wheeling. An oil gun can handle the filtered mineral oils for overdrive and free wheeling transmissions.

The mixing of e.p. and powerful hypoid gear lubricants of different makes and composition is strongly advised against. It is almost impossible and uneconomical to handle regular gear lubricants in addition to overdrive transmission lubricants, e.p. gear lubricants and hypoid gear lubricants. A service station has to dispense e.p. and hypoid gear lubricants 100 per cent with the exception of overdrive transmission lubricants. The 25-pound and 100-pound containers are the packages best fitted for national distribution. Flushers and their use will eliminate complaints and increase poundage.

Br. Synthetic Gasoline Firm in Liquidation

LONDON, Jan. 8.—One of the first and most important of the various companies producing synthetic gasoline from coal in the United Kingdom, Coal and Allied Industries, Ltd., went into voluntary liquidation Dec. 31.

Under various titles the enterprise has existed for a quarter of a century. In 1928, when it was known as Motor Fuel Proprietary, Ltd., the company was very active. The plant in those days was at Slough and operated experimental apparatus designed to deal with the Dvorkovitz patents. Nothing came of this work. In 1934 the Dvorkovitz process was abandoned. This was on the advice of H. P. Stephenson, who had joined the company as technical adviser in 1933. Instead, the directors decided to "develop an entirely new process evolved by Mr. Stephenson."

In 1934 the company announced that, in the development of the new process it had employed the largest staff of fully qualified research chemists of any similar undertakings. Profits of £271,250 ($1,356,250) were held out as likely to result from the process. The erection of many similar plants was foreshadowed and the directors announced that they were negotiating for the sale of foreign rights.

The company then got busy with the erection of a modern plant at Seaham Harbor to operate the process. But in December, 1935, a disastrous fire put most of the plant out of operation. The directors said that about £50,000 ($250,000) would be required to put the plant in operation again.

Last June a progress report stated that reconstruction had been completed and that the first half of the carbonizing plant was working smoothly. In September it was announced that 30,000 gallons of gasoline had been sold.

At the beginning of December stockholders were informed that an issue of £220,000 of 5 per cent debenture stock was offered. As this met with a negative response, the company decided upon liquidation.

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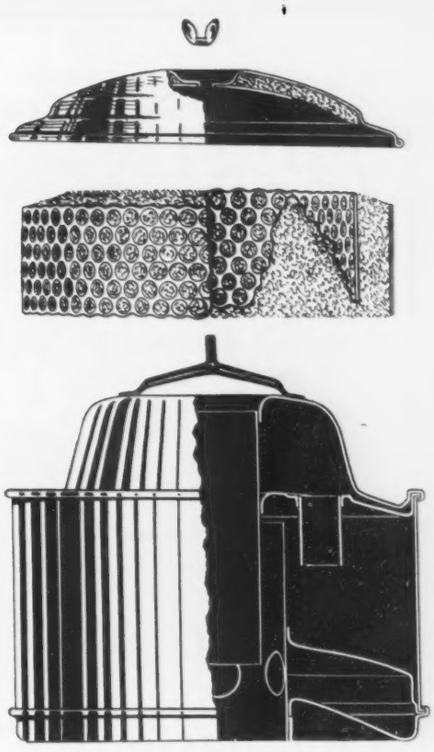
RECOGNIZING THE AIR CLEANER

As a Profitable Service Item



The air cleaner used on the 1937 Buick 40 model

LITTLE attention is paid to the air cleaner by most service station attendants and yet it offers a great opportunity for additional profits as an extra-service item. Then too, there are many logical reasons which the attendant can use to sell the customer on the need for having his air cleaner serviced.

In the first place, an air cleaner that has a dirty filter element allows dirt to pass into the engine through the carburetor intake. In the second place, a dirty air cleaner filter element restricts the flow of air to the carburetor, automatically causing a richer mixture of gasoline and air in the mixing chamber, with the result that the engine has a greatly increased fuel consumption.

The job of cleaning the air cleaner is not difficult, and commonly brings anywhere from a 25-cent to 50-cent service charge. The car manufacturers in general recommend that these units be serviced every 1000 or 2000 miles, and in dusty country or dust storm areas, every 100 miles or every day.

Air cleaners are standard equipment for all 1937 cars, and as an added precaution against dirt getting into the crankcase, the oil fill pipe caps on many models are provided with a wire mesh filter. So it is not difficult to appreciate the profit advantage in going after this type of service.

While the term "air cleaner" has been generally adopted for this unit, it also combines another feature of eliminating the hissing carburetor noises that were prevalent in former years, particularly at high operating speeds. In this respect it serves also as an intake silencer.

There are two major types of air cleaners—the "wire gauze" type and the "oil bath" type. The wire gauze type consists of a screen or cage usually filled with a wire mesh, similar to wire wool used in the kitchen. This is dipped into a heavy grade of engine oil, usually an SAE 50, and after draining is placed on the top or end of the air cleaner, depending upon whether or not the cleaner is assembled in a vertical or horizontal position. The oily gauze attracts the dust, and when it has caught all the dust it will hold it allows the dirt to pass into the combustion chambers, causing undue wear on engine parts.

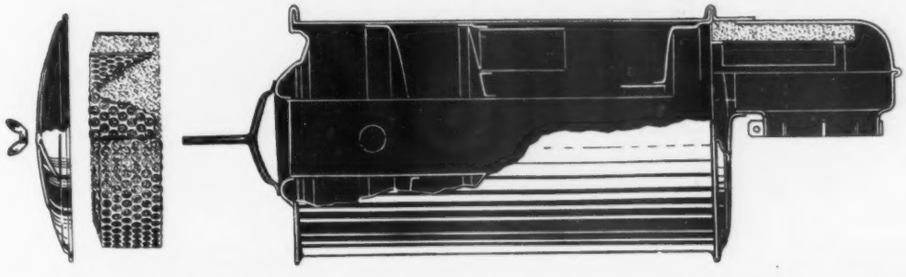
The end or top cover of this cleaner may or may not be removable. If not removable, the entire cleaner unit must be removed for cleaning by washing in kerosine. After the unit has been blown dry with air so that all kerosine is removed, the unit is dipped in the oil, the excess oil allowed to drain off, and the unit replaced over the carburetor intake.

If the top cover of the unit is removable, the fact will be evident to the attendant by a wing nut at the center of the cover. When the top is removed on this type of unit, the filter element can be taken out of the cage and cleaned as above. A felt pad will be found under the top of the unit which should not be oiled.

The "oil bath" type air cleaner, optional equipment on most 1937 cars where they are to be operated in dusty areas, brings the intake air into contact with a reservoir of oil in addition to passing the air through the wire mesh. Besides removing and cleaning the wire gauze in this type of cleaner, the base or oil reservoir must be scraped out and cleaned with kerosine and the base refilled with engine oil, usually SAE 50, to the indicated oil level shown on the inside of the base. The oil bath cleaner has a capacity of from one pint to one quart.

On the 1937 Chevrolet the removable top air cleaner is used, with a cleaning service recommended every 2000 miles. Under extreme conditions, on gravel or dusty roads, Chevrolet has available a heavy duty oil bath air cleaner.

In operation this heavy duty cleaner takes air in through louvres around the top where it passes downward to an annular venturi just above the oil level. The increased air velocity, due to the venturi effect, throws the heavier dust particles into the oil at the base of the cleaner. The high velocity of the air stream picks up some of the oil and carries it upward into the oil wetted type filter element. This constant oil circulation keeps the filter element washed at all times and returns the collected impurities to the base where they settle.



The horizontal type air cleaner used on the large Buicks for 1937

CHEVROLET specifies SAE 50 oil for the cleaner reservoir. One pint of oil is required and it must be kept at the proper level. Cleaning of the filter element and reservoir on the heavy duty cleaner is recommended for once a day or never longer than twice a week in extreme dusty conditions.

Buick for 1937 has a horizontal type air cleaner on its three largest models, and the vertical type on its series 40. Both have removable tops and have filter elements that are cleaned in the conventional manner, such service being recommended every 2500 miles. Buick also supplies an oil bath cleaner which can be distinguished by its combination horizontal and vertical units. This unit can also be serviced by unscrewing the wing nut on top of the cleaner. The reservoir carries one pint of No. 50 cylinder oil, and is to be changed every 10,000 miles.

All 1937 Cadillac and LaSalle cars are equipped with oil bath air cleaners as standard equipment. They require regular cleaning every 2000 miles, or more often under extreme conditions. Cadillac states that the wire mesh should be thoroughly washed with gasoline and dried, no oil to be placed on the mesh after cleaning. The reservoir holds one pint.

On all Chrysler-built cars, including Chrysler, DeSoto, Dodge, and Plymouth, a

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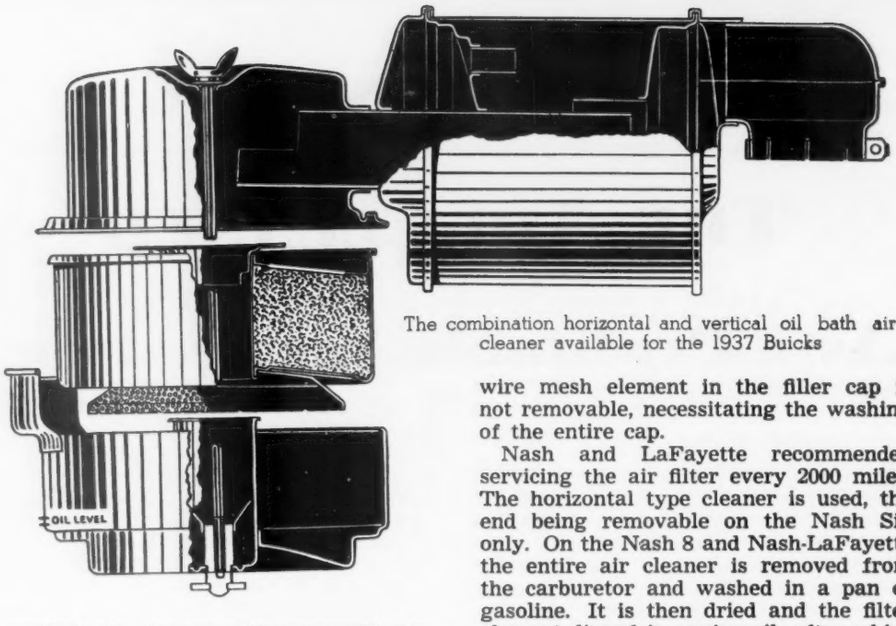


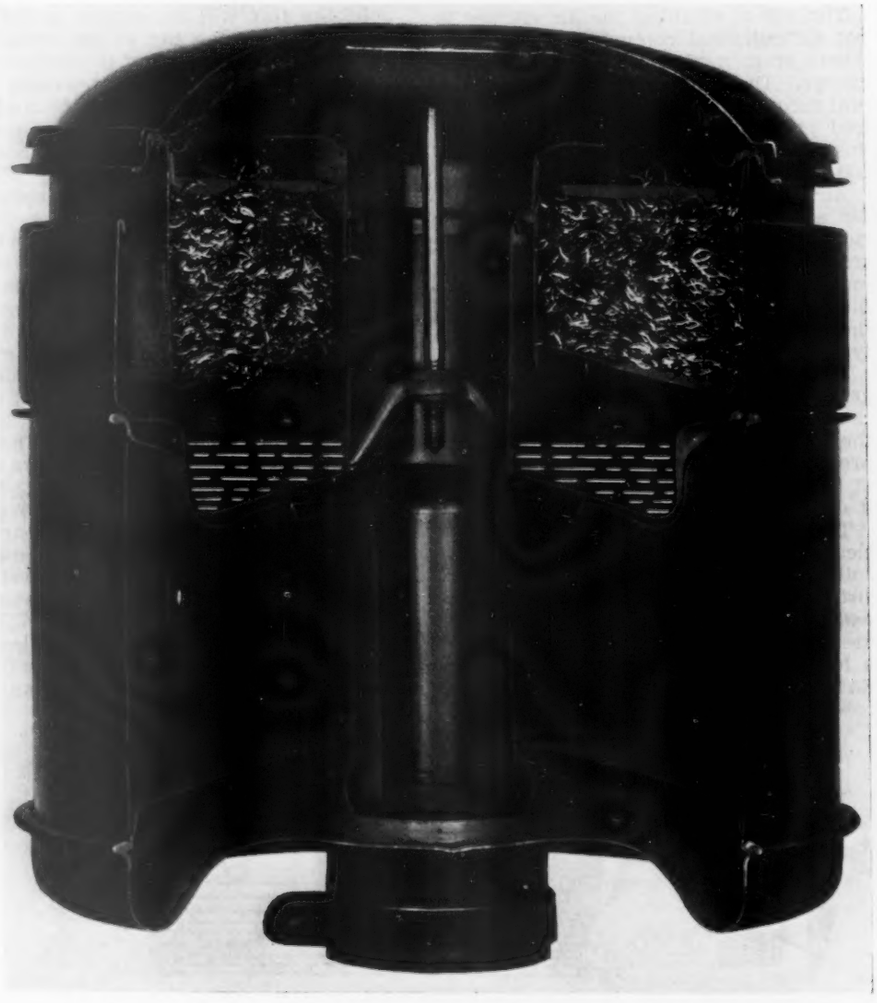
The combination horizontal and vertical oil bath air cleaner available for the 1937 Buicks

vertical air cleaner with removable top is used. It is recommended that these units be cleaned every 2000 miles and even once a day in extreme dusty territories, washing the filter in kerosine, thoroughly drying it, and re-oiling the filter element with SAE 50 engine oil. On these cars the oil filler cap also has an air cleaner which is to receive a similar cleaning treatment every 2000 miles. The wire mesh element in the filler cap is not removable, necessitating the washing of the entire cap.

Nash and LaFayette recommended servicing the air filter every 2000 miles. The horizontal type cleaner is used, the end being removable on the Nash Six only. On the Nash 8 and Nash-LaFayette the entire air cleaner is removed from the carburetor and washed in a pan of gasoline. It is then dried and the filter element dipped in engine oil, after which it is drained and replaced on the car. Similar cleaning procedure is followed on the Nash Six unit, except that the filter element should be disassembled before cleaning.

Packard now has an oil bath type air cleaner as standard equipment on all models except the 12-cylinder car.

Oldsmobile and Ford are both equipped



The oil bath type air cleaner available for 1937 Pontiacs in dusty territory

with the vertical type air cleaner, with removable top for easy cleaning. On the small Ford engine, the oil fill pipe cap is designed to include a wire mesh element which should be cleaned at the same time the air cleaner is serviced. Cleaning is recommended every 1000 miles by Ford.

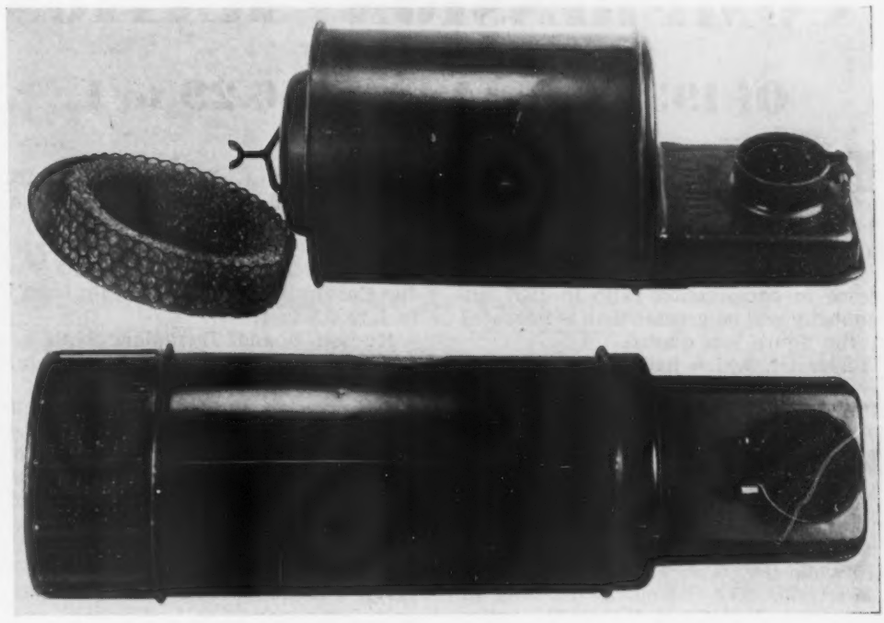
The air cleaner on the 1937 Pontiac should be inspected every 1000 miles and cleaned if necessary, according to that company's instructions to its dealers. In any event, the cleaner should be cleaned every 5000 miles. The top on the Pontiac cleaner is removable, permitting the removal of the filter element without taking off the entire unit. Cleaning of the element in either gasoline or kerosine is recommended, after which an SAE 50 cylinder oil is to be used to saturate the element. The attendant is cautioned to remove the felt pad before cleaning and re-oiling the element.

An oil bath air cleaner is optional on the Pontiac, and is installed at the factory at the request of the dealer. It is a self-washing type of cleaner, similar to the Chevrolet type of oil bath cleaner, and servicing and cleaning is recommended every 10,000 miles. The reservoir capacity is one pint, and it is recommended that an SAE 50 engine oil be used in the reservoir, with a lighter oil for winter operation.

Pontiac cautions that the filter element should not be oiled when the unit is disassembled, as this element is automatically oiled in operation.

Studebaker for 1937 offers an optional oil bath type of air cleaner. Also an air cleaner is used in the crankcase oil filter cap to keep dust out of the oil. Conventional recommendations are made in regard to these filters, with a cleaning suggested every 1000 miles.

The horizontal type air cleaners are used on the Nash and La Fayette. The end is removable on the Nash Six only. On the Nash Eight and La Fayette the entire cleaner is removed as a unit



Dust particles are highly abrasive and careful servicing of the air cleaner at proper intervals is essential if unusual wear and service expenses on engine parts are to be avoided. The station attendant can make the point to his customers that preventive service is always preferable to corrective service, and that a properly serviced air cleaner prevents harmful abrasive particles from reaching the wearing surfaces of the engine parts.

Cleaning and oiling the air filter is not a difficult or time-consuming task, and station attendants who give attention to this neglected service will find a new source of profit easily within reach.

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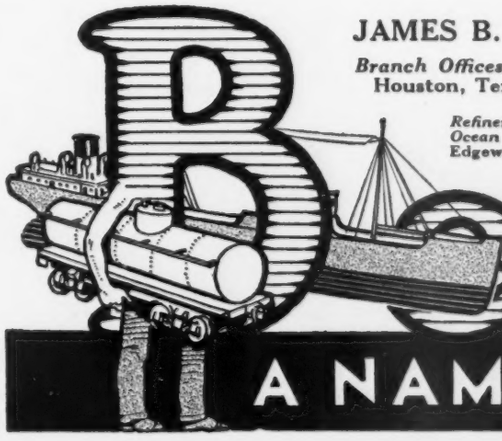

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A NAME TO REMEMBER

Compression Ratios

Of 1937 Cars Average 6.29 to 1

THE average compression ratio of 45 passenger car models in 1937 is 6.29 to 1. The average compression ratio of comparable 1936 models was 6.13 to 1.

On a weighted average basis the increase in compression ratio in 1937 undoubtedly will be greater than is indicated by the figure just quoted.

Chevrolet, which had a 6.0 to 1 compression ratio in 1936 has stepped its ratio up to 6.25 to 1. The new Ford V-8 60 has a compression ratio of 6.75 to 1. This compares with a ratio of 6.30 to 1 in the larger Ford V-8 85.

A substantial increase in compression ratio has been made in each of the Buick models. The 40 steps up from 5.55 to 5.70 while the 60, 80 and 90 are up from 5.45 to 5.75. The Oldsmobile 6 moves up from 6.0 to 1 to 6.1 to 1 in 1937. Other General Motors cars are unchanged.

In the Chrysler line no changes have been made in Dodge at 6.5 to 1 or Plymouth at 6.7 to 1. DeSoto moves up from 6.0 to 1 to 6.5 to 1. A similar change is made in the Chrysler 6. The Chrysler Imperial 8 has been stepped up from 6.5 to 1 to 6.7 to 1 while the Airflow 8 and the Custom Imperial 8 move up from 6.2 to 1 to 6.5 to 1.

Hudson 8 and Terraplane both have increased the compression ratio on standard heads from 6 to 1 to 6.25 to 1.

Compression ratios of the Nash line also have been increased. The LaFayette 400 now is 5.61 to 1 compared with 5.54 to 1 last year. The Nash Ambassador 6 is now 5.67 to 1 and the 8 is 5.64 to 1. A year ago both of these were 5.25 to 1.

In two instances compression ratios are lower. The Lincoln-Zephyr has dropped its compression ratio to 6.7 to 1 from last year's 7.1 to 1. The same brake horsepower rating is kept but the maximum rating is reached at 3900 r.p.m. as compared with 3800 r.p.m. a year ago. Cord also reaches its maximum power at a higher engine speed and has reduced its compression ratio from 6.5 to 1 to 6.32 to 1.

Few changes have been made in optional cylinder heads in 1937. Fifteen models with optional heads average a compression ratio of 6.48 to 1. A year ago 11 models with optional heads averaged 6.43 to 1.

Maximum horsepower at specified motor speed shows little change this year. Inclusion of the new smaller Ford is largely responsible for bringing the average for 1937 down to 115 horsepower this year compared with 116.4 a year ago.

Increases in horsepower are reported by Chevrolet, Buick, Pontiac, Oldsmobile and La Salle in the General Motors line. The Hudson line also is higher.

No trend can be observed in engine speeds. The average of all models this year is given at 3560 compared with 3497 in 1936.

Changes in piston displacement in 1937 cars also have been few. General average for all models is 275.4 cubic inches compared with 280.2 cubic inches in 1936. The new Ford V-8 60 has a piston displacement of only 135.9 cubic inches, bringing the average down considerably. Chevrolet has been increased from 206.8 to 216.5 cubic inches.

Compression Ratios and Maximum Horsepower Ratings of 1937 and 1936 Passenger Cars

	1937 Compression Ratio		1936 Compression Ratio		1937 Max. H. P. at Specified R. P. M.		1936 Max. H. P. at Specified R. P. M.		1937 Piston Displacement	1936 Piston Displacement
	St.	Op.	St.	Op.						
Buick 40	5.70	....	5.55	....	100	3,200	93	3,200	248.0	233.0
Buick 60	5.75	....	5.45	....	130	3,400	120	3,200	320.2	320.2
Buick 80	5.75	....	5.45	....	130	3,400	120	3,200	320.2	320.2
Buick 90	5.75	....	5.45	....	130	3,400	120	3,200	320.2	320.2
Cadillac V8 60	6.25	5.75	6.25	....	135	3,400	125	3,400	346.0	322.2
Cadillac V8 65, 70, 75	6.25	5.75	6.25	....	135	3,400	135	3,400	346.0	346.0
Cadillac V12	6.00	5.65	6.00	5.65	150	3,600	150	3,600	368.0	360.0
Cadillac V16	6.00	5.65	6.00	5.65	185	3,800	185	3,800	452.0	452.2
Chevrolet	6.25	....	6.00	....	85	3,200	79	3,200	216.5	206.8
Chrysler 6	6.50	7.00	6.00	6.50	93	3,600	93	3,400	228.1	241.6
Chrysler Imp. 8	6.70	....	6.50	7.45	110	3,600	130	3,400	273.8	323.5
Chrysler AF8, Cast. Imp.	6.50	7.45	6.20	6.50	130	3,400	115	3,400	323.5	323.5
Cord 8	6.32	....	6.50	....	115	3,600	125	3,500	288.6	288.6
DeSoto 6	6.50	7.00	6.00	6.50	93	3,600	93	3,400	228.1	241.6
Dodge 6	6.50	....	6.50	....	87	3,600	87	3,600	217.8	217.8
Duesenberg 8	5.20	....	5.20	....	265	4,200	265	4,200	420.0	420.0
Ford V8 60	6.75	....	....	....	60	3,500	...	.....	135.9	.....
Ford V8 85	6.30	....	6.30	....	90	3,800	90	3,800	221.0	221.0
Graham 6—85	6.80	....	6.80	....	70	3,500	70	3,500	169.6	169.6
Graham 6—95	6.70	....	6.70	....	85	3,300	85	3,300	199.1	217.8
Graham 6—116	6.70	....	....	....	106	4,000	...	.....	199.1	.....
Graham 6—120	6.70	....	6.70	....	116	4,000	112	4,000	217.8	217.8
Hudson 6	6.25	7.00	6.25	7.00	101	4,000	93	3,800	212.0	212.1
Hudson 8	6.25	7.00	6.00	7.00	122	4,200	113	3,800	254.0	254.5
LaSalle V8	6.25	5.75	6.25	5.75	123	3,400	105	3,600	322.0	248.0
Lincoln Zephyr	6.70	....	7.10	....	110	3,900	110	3,800	267.3	267.3
Lincoln V12	6.38	....	6.38	....	150	3,400	150	3,400	414.0	414.0
Nash Lafayette 400	5.61	5.88	5.54	5.73	90	3,400	83	3,200	234.8	217.8
Nash Amb. 6	5.67	....	5.25	....	95	3,400	93	3,400	234.8	234.8
Nash Amb. 8	5.64	....	5.25	....	105	3,400	102	3,400	260.8	260.8
Oldsmobile 6	6.10	....	6.00	....	95	3,400	90	3,400	229.7	213.3
Oldsmobile 8	6.20	....	6.20	....	110	3,600	100	3,400	257.1	240.3
Packard 6	6.30	6.75	6.50	....	100	3,600	...	.....	237.0	.....
Packard 120	6.50	7.00	6.50	....	120	3,800	120	3,800	282.0	282.0
Packard Super 8	6.50	....	6.30	....	130	3,200	150	3,200	320.0	384.8
Packard 12	6.40	6.0-7.0	6.40	....	175	3,200	175	3,200	473.0	473.0
Pierce Arrow 8	6.40	....	6.40	....	150	3,400	150	3,400	385.5	385.5
Pierce Arrow 12	6.40	....	6.40	....	185	3,400	185	3,400	462.0	462.0
Plymouth 6	6.70	....	6.70	....	82	3,600	82	3,600	201.3	201.3
Pontiac 6	6.20	....	6.20	....	85	3,520	80	3,600	222.7	208.0
Pontiac 8	6.20	....	6.20	....	99	3,800	87	3,800	248.9	232.0
Studebaker Dict. 6	6.00	....	6.30	....	90	3,400	90	3,400	217.8	217.0
Studebaker Pres. 8	6.50	....	6.50	....	115	3,600	115	3,600	250.4	250.4
Terraplane 6	6.25	7.00	6.00	7.00	96	3,900	88	3,800	212.0	212.1
Willys 37	5.70	....	5.70	....	48	3,200	48	3,200	134.2	134.2
Average	6.29	6.48	6.13	6.43	115.0	3,560	116.4	3,497	275.4	280.2

EVERY SECOND CAR

Is a Ford or "Chevvie"

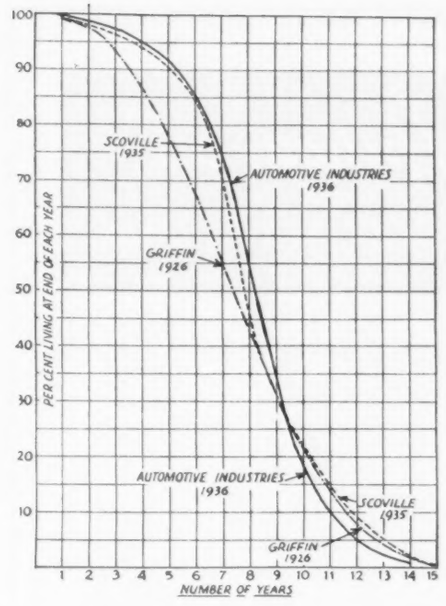
An analysis of passenger car registrations at the end of 1935 also showed that the average car in use is over 4 years old, and that the average car life today is estimated at 8 years.

SLIGHTLY over half of all the 17,896,616 cars in use at the end of 1935 were Fords and Chevrolets. At the end of that year, 28.95 per cent of all the cars that rolled into the service stations of the nation were Fords and 24.66 per cent were Chevrolets. Third in the list of surviving cars as 1935 completed its term was Plymouth, with 6.99 per cent.

These interesting figures were revealed by A. Ludlow Clayden, of the Sun Oil Co., and Marcus Ainsworth, of Automotive Industries, in an analysis of passenger car registrations presented before the annual meeting of the American Petroleum Institute at Chicago last November.

It is shown in this survey that, at the close of 1935, of the total Fords on the road, about 50 per cent were of the model "A" type, 33 per cent were V-8's, and approximately 17 per cent were of the model "T" vintage.

The survey also pointed out the little known fact that, while 99.5 per cent of the cars manufactured in 1935 were still in use at the end of that year, these cars represented only 15.26 per cent of the total cars in use. The cars made in 1929, of which 75 per cent were surviving at the end of 1935, represented 16.26 per cent of the total cars in use. In other words, there were more 1929 cars in use a year ago than there were cars made in 1935.



A comparison of three survival curves. The survival curve indicates the rate at which motor vehicles go out of service

The cars made in 1930 came close to equaling the number of 1935-made cars on the road at the end of 1935, accounting for 12.46 per cent of the total cars in use. One per cent of the cars made in 1922 were in use a year ago, although only 0.13 per cent of the cars on the road as 1935 ended were of this early birth, it was shown by Clayden and Ainsworth.

From a study of survival curves the authors found the average car life today to be 8.4 years, while the average age of cars in use at the time the survey was made was estimated to be 4.71 years, as compared with 3.07 years at the end of 1924.

The rapid rise of cars in use which require extreme pressure lubricants is also shown in the survey. Of the total cars made in 1930, only 48,560 had e.p. lubricant recommendations, while 1,210,137 of

Survival Table—Showing the Make, Year, and Number of Passenger Cars in Use Dec. 31, 1935

Year of Manufacture	Per Cent Surviving	Auburn	Buick	Cadillac	Chevrolet	Chrysler	De Soto	Dodge	Durant	Ford	Franklin	Graham	Hudson
1935	99.5	5,137	87,197	6,659	653,415	40,333	26,817	177,876	.....	822,386	.....	15,885	21,479
1934	98.7	5,464	62,247	4,835	527,952	27,687	11,298	88,967	.....	523,631	355	12,719	19,056
1933	97.5	4,912	42,714	3,805	462,631	27,960	20,728	83,910	.....	303,335	1,296	9,875	2,872
1932	95.1	11,075	47,272	5,962	307,040	24,741	24,072	26,734	1,079	246,240	1,739	12,228	8,218
1931	92.0	27,173	83,603	10,245	536,755	48,438	36,156	48,843	6,651	486,295	3,571	17,672	17,654
1930	85.0	9,580	104,258	10,266	526,051	51,772	29,977	54,489	18,224	896,832	6,360	25,619	25,896
1929	75.0	13,388	129,230	11,202	585,008	63,388	44,710	86,830	35,786	982,601	8,028	45,365	47,019
1928	55.0	6,134	107,630	9,973	422,327	77,990	7,990	81,698	39,195	264,739	4,083	32,128	26,571
1927	34.5	3,393	80,188	6,468	223,494	53,211	.....	42,752	19,589	135,731	2,596	6,413	19,892
1926	19.0	1,352	43,623	4,700	93,832	24,694	.....	42,442	17,441	225,911	1,363	5,776	13,052
1925	10.0	560	20,857	2,280	36,650	10,746	.....	20,925	454	160,326	950	381	10,984
1924	5.0	130	8,350	896	14,775	1,572	.....	9,716	377	81,382	305	343	2,972
1923	2.3	92	5,021	511	10,690	1,555	.....	3,473	910	40,486	229	94	1,072
1922	1.0	24	1,385	220	2,404	548	.....	1,420	551	11,559	81	93	282
Total in use, December 31, 1935		88,414	823,575	78,022	4,413,024	454,635	191,747	770,075	140,257	5,181,454	30,956	184,591	217,019

Year of Manufacture	Hupmobile	La Salle	Lincoln	Nash	Oldsmobile	Packard	Pierce-Arrow	Plymouth	Pontiac	Reo	Studebaker	Terraplane-Essex	Willys-Whippet-W.K.
1935	7,413	11,716	2,358	17,650	148,628	37,465	871	381,070	139,421	3,874	39,375	53,569	10,387
1934	6,481	5,115	2,034	14,129	70,744	6,467	1,717	298,624	71,701	3,804	41,020	39,983	6,490
1933	6,558	3,616	2,059	11,069	34,413	8,854	2,098	243,425	83,214	3,532	21,146	34,935	15,275
1932	10,265	3,659	3,023	19,242	22,946	10,516	2,560	106,442	45,578	3,680	23,777	27,368	24,629
1931	16,033	6,332	3,189	36,217	43,224	14,955	4,160	86,746	67,296	6,221	42,810	39,141	47,234
1930	20,661	9,573	3,703	43,423	42,933	24,070	5,776	54,656	58,131	9,732	48,047	53,837	55,901
1929	33,253	15,217	4,613	78,860	70,112	33,475	6,290	63,727	118,704	12,989	62,129	143,498	149,782
1928	30,493	10,315	3,315	63,260	40,484	23,590	3,155	16,127	101,104	11,752	58,868	97,434	127,029
1927	11,664	3,785	2,229	37,943	16,758	10,817	2,013	.....	39,746	7,640	32,719	57,894	48,095
1926	7,196	.....	1,457	22,469	9,217	5,458	1,050	.....	9,476	1,983	17,875	24,854	27,077
1925	3,729	.....	838	8,547	4,390	3,203	555	.....	3	1,401	13,383	15,963	21,500
1924	1,550	.....	351	2,693	2,286	754	158	.....	.....	581	5,376	3,726	8,099
1923	881	.....	182	1,303	768	434	45	.....	.....	388	3,451	981	4,526
1922	342	.....	54	415	212	154	45	.....	.....	118	1,101	362	951
Total in use, Dec. 31, 1935	156,519	69,328	29,405	357,220	507,115	180,212	30,463	1,250,817	734,374	67,695	411,077	593,545	546,975

the 1935 cars required such a lubricant. This, according to Clayden and Ainsworth, indicates the beginning of a rapid rise. With a 5,000,000 car year estimated for 1937, it is believed that well over 3,000,000 will specify extreme pressure lubricants.

In order for Clayden and Ainsworth to calculate the number of cars in use at any given date from the number of new cars that have gone into service over a period of time, it was necessary to apply some formula as to the rate at which motor vehicles go out of service. This is known as a mortality curve, and the resultant curve of those which remain in use is called the "survival" curve.

The curve used by Clayden and Ainsworth was based on two similar curves, one compiled by Professor Griffin, of the University of Michigan, and the other by John Scoville, chief statistician for the Chrysler Corp.

By using the Automotive Industries curve the number of cars in use at the end of 1935 was estimated to have been approximately 18,000,000. By the same method, the number of cars that went out of service during the year amounted to about 3,000,000 units. This indicated a total registration throughout 1935 of about 21,000,000 cars in the U. S.

It is pointed out by the authors, however, that no one knows exactly how many cars have been in service throughout a given period, and that registration figures indicate many duplications.

Clayden and Ainsworth, in their paper, freely admit that the survival curve used in their calculations, and the resultant data computed by the use of the curve, are subject to controversy. It is stated that the study is of a quantitative, rather than a qualitative, basis; but it is believed that the table is a reasonably correct picture of the situation at the end of 1935.

In the study of the fuels required, it was shown that a little more than one third of the cars in use at the end of 1935

Number and Percentages of Cars In Use—By Makes

(*As of December* 31, 1935)

Make	Number Surviving	Per Cent Of Total
Ford	5,181,454	28.95
Chevrolet	4,413,024	24.66
Plymouth	1,250,817	6.99
Buick	823,575	4.60
Dodge	770,075	4.30
Pontiac	734,374	4.10
Terraplane-Essex	593,545	3.32
Willys-Overland	546,975	3.06
Oldsmobile	507,115	2.83
Chrysler	454,635	2.54
Studebaker	411,077	2.30
Nash	357,220	2.00
Hudson	217,019	1.21
DeSoto	191,747	1.07
Graham	184,591	1.03
Packard	180,212	1.01
Hupmobile	156,519	0.87
Durant	140,257	4.78
Auburn	88,414	0.49
Cadillac	78,022	0.44
LaSalle	69,328	0.39
Reo	67,695	0.38
Franklin	30,956	0.17
Pierce Arrow	30,463	0.17
Lincoln	29,405	0.16
Miscellaneous	388,102	2.18
Total	17,896,616	100.00

Number and Percentage of Total Cars In Use—By Years of Manufacture

(*As of December* 31, 1935)

Year of Manufacture	Per Cent Surviving	New Registrations	Number Surviving	Per Cent of Total
1935	99.5	2,743,908	2,730,188	15.26
1934	98.7	1,888,557	1,864,006	10.42
1933	97.5	1,493,794	1,456,449	8.14
1932	95.1	1,096,399	1,042,675	5.83
1931	92.0	1,908,141	1,755,490	9.81
1930	85.0	2,625,979	2,230,082	12.46
1929	75.0	3,880,206	2,910,154	16.26
1928	55.0	3,139,579	1,726,768	9.65
1927	34.5	2,623,538	905,120	5.05
1926	19.0	3,228,401	613,396	3.43
1925	10.0	3,870,744	387,074	2.16
1924	5.0	3,303,646	165,182	0.92
1923	2.3	3,753,945	86,341	0.48
1922	1.0	2,369,089	23,691	0.13
Total surviving			17,896,616	100.00

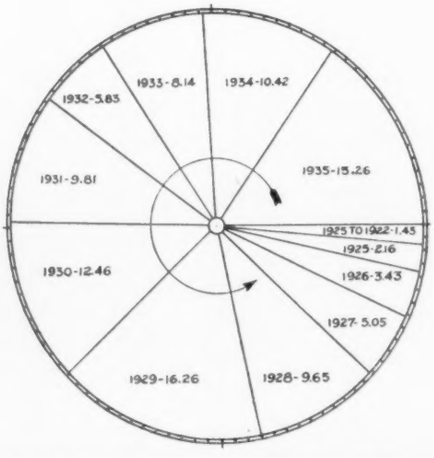


Chart showing cars in use, by years of manufacture, at the end of 1935

Huffman Announces

TWO SENSATIONAL NEW HYPOID GEAR LUBRICATORS

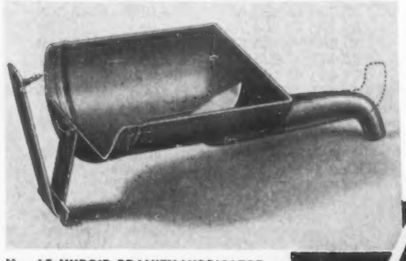
FASTEST, MOST ECONOMICAL DISPENSERS FOR CANNED HYPOID LUBRICANT!

Hypoid gears, which are used in over two-thirds of the 1937 cars, not only demand special lubricant, but also require a *special hypoid lubricant dispenser.* And Huffman is first again, with the most efficient and economical dispensers for this lubrication need! Huffman announces two types of hypoid dispensers for canned lubricant—the pressure type, and the gravity type. Both are suitable for dispensing *all types* of hypoid lubricant, and the spouts of each will clear the opening of any 1937 car! Both are simple to operate, and insure greatest economy and cleanliness. And each is the fastest dispenser of its kind yet developed! You can't afford to be without a Huffman Hypoid Lubricator. It will save you time and money. Order from your jobber now!

HUFFMAN MANUFACTURING COMPANY
DAYTON, OHIO

No. 60 HYPOID PRESSURE LUBRICATOR

This dispenser fits one, two, three and ten-pound cans, and is the fastest, cleanest, and most efficient method yet devised for servicing Hypoid gears! The knife cuts a circular opening in the top of the can, and the pump barrel is sealed to the top of the can by a three-quarter turn to the right. The lubricant is delivered by pumping the knurled cylinder up and down. Requires only ten strokes per pound for complete delivery.



No. 65 HYPOID GRAVITY LUBRICATOR

Less expensive than the No. 60, but a thoroughly efficient and satisfactory dispenser for Hypoid gear lubricants. Will drain No. 90 SAE lubricant in an average of 40 seconds, and No. 160 SAE lubricant in 90 seconds. Spout turns axially to reach any opening. Easy pressure cuts the delivery opening in the can, and a quick tap punches vent hole in the bottom of the can.

Huffman

SERVICE STATION EQUIPMENT

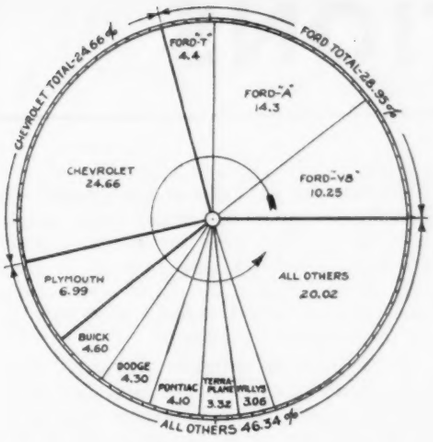


Chart showing cars in use, by makes, at the end of 1935

required a 68 to 70 octane gasoline, and approximately 2 per cent required a fuel with a still higher octane rating. The authors said that an analysis made on the basis of figures available at the end of 1936 would indicate a very considerable increase in the 70 octane class.

Telephone Calls Effective

A personal telephone call to the guest's room is made by the garage serving patrons of the Julien Dubuque hotel, Dubuque, Iowa, to solicit gasoline, motor oil, lubrication, and car washing sales on automobiles left for storage. Results are reported to be more productive than having a doorman inquire about the automobile's needs when the tourist leaves his car at the hotel entrance.

Robert C. Gulley, manager of the Motor Ramp garage, reports that of all hotel storage customers reached on the telephone about 75 per cent will make some purchase on account of the solicitation.

Seek Oil For War Purposes

LONDON, Jan. 2.—European nations are now buying up great quantities of Rumanian oil for "war purposes," according to international officials engaged in the Rumanian petroleum industry.

Germany has recently made a very special effort to secure yet larger quantities of Rumanian oil, in which industry there is more British capital invested than from any other nation, but at present trade agreements stand in her way. Rumania demands payment in strong currency, while Germany can only offer goods.

British Consumption Higher

LONDON, Jan. 2.—The United Kingdom's gasoline consumption for 1936 is fully expected to exceed 1935's record total by a good margin. Figures just issued by the Society of Motor Manufacturers and Traders, London, show a further marked expansion in October consumption.

The aggregate for the 10 months to the end of October is 1,139,102,000 Imperial gallons, as against 1,093,781,000 gallons in the corresponding period of 1935.

Low Non-Skid Cost Boosts Tire Sales

LOS ANGELES, Jan. 4.—A good argument to be used by service stations in bettering the turnover in tire merchandise has been advanced by Associated Oil Co. in connection with its dealer instruction program.

"Non-skid protection at practically no cost", is the slogan. Because winter weather is the easiest on tires, Associated dealers are urging motorists to buy their tires now and get the advantage of new non-skid tread while rolling up a lot of mileage at no cost. The dealer points out that tests have proven the wear and tear on tires in cool weather is about half that in summer.

Tires can be purchased on credit cards, or on Associated's special budget plan, which permits installment payments.

New Goodyear Plant

JACKSON, Mich., Jan. 9.—A new plant, costing $3,500,000 and employing 1500 men, is to be built here by the Goodyear Tire & Rubber Co. It is understood that the plant will be completed and production begun by June 15, 1937.

The company recently purchased the 38-acre site from the Kelsey-Hayes Wheel Corp.

PETROLEUM PRODUCTS

REPUBLIC

Of Highest Quality

Refined at Texas City Texas

SUPPLIED QUICKLY, DEPENDABLY FROM MODERN REFINERIES

Deep Water Terminals

Carteret, N. J. Norfolk, Va. Wilmington, N. C. Jacksonville, Fla. Cincinnati, O. Baltimore, Md. Hopewell, Va. Savannah, Ga. Texas City, Tex. Pittsburgh, Pa.

Division Sales Offices

30 Rockefeller Plaza
R. C. A. Bldg., New York

Union Trust Bldg.
Petersburg, Va.

Second Nat'l Bank Bldg.
Houston, Tex.

2100 Dobler Ave.
Baltimore, Md.

207 Stafford Place
Greensboro, N. C.

Berkley & Liston Sts.
Cincinnati, Ohio

REPUBLIC OIL COMPANY

General Sales Offices: Benedum-Trees Building

PITTSBURGH, PENNSYLVANIA

Selling AT STATIONS

ONE service station operator called on NATIONAL PETROLEUM NEWS for aid. He asked the solution of a problem familiar to all dealers.

We quote from his letter . . . "and so I have been unable to figure out whether it is cheaper and better business sense to cut illumination to a minimum at my service station, particularly during winter months and late in the evening, or to keep all lights burning as long as the station is open for business. I know for a fact that a well lighted station attracts customers . . . but is enough business thus procured to pay the increased cost of electricity? Or is it advisable to cut down here and there? Do you know of the experiences of other dealers with this problem? Can you pass such information on to me?"

We realize the existence of a real problem where the amount of illumination advisable for a service station is concerned and would like to know how others have met it.

Can other dealers who have possibly solved this puzzler help a brother in distress?

If so, let them send their findings to this department where they will be published for the benefit of all concerned.

* * *

One Quart "Empty"

Able merchandising executives rack their brains for catch phrases to be used in driveway selling.

A successful retailer uses a catch phrase in answering the telephone. Instead of saying; "Blank Drug Co.," upon lifting the receiver, his clerks are instructed to answer in musical tones, "Hello, Blank".

The results of this practise are not readily discernible but this merchant states that it is one of those phrases that "vibrates" or "clicks", as the radio people put it.

One service station operator has happened onto two catch phrases that sell motor oil.

Upon finding a car which needs a quart of oil he displays the bayonette in the usual manner and says to the customer; "Your crankcase is one quart *empty*."

It seems to us that the use of this phrase *dramatizes* more effectively the need for motor oil than the ordinary "you need a quart" or "you're a quart low".

The word "empty" when applied to a crankcase should, in most cases, strike a note of alarm in the mind of a customer and cause him to appreciate more fully the actual need of a quart of oil.

The other phrase recommended by this Cleveland dealer is also based on customer psychology.

When, as happens in so many instances, the customer fails to name the brand of motor oil desired this operator says; "I have winter oil at 25, 30 and 35 cents a quart."

According to our informant it is amusing as well as surprising to witness the result of this semi-question. He states that rarely does the customer ask for anything less than the 25 cent grade and that surprisingly often the customer compromises with himself and orders 30 cent oil.

The logic behind these results is apparent.

The customer has heard the term "winter oil" stressed over and over through the combined advertising of the oil companies. In newspapers, on bill boards, sidewalk stands, banners and over the radio he has been advised to use winter oils.

When the station man mentions "winter oil" the customer's preference is immediate and automatic, thus eliminating the cheaper grades from the picture.

Fruit and vegetable merchants will vouch for the fact that many customers will buy the middle grade of merchandise whenever three prices are mentioned.

This fact has been borne out in actual driveway experiments.

It would be foolish to use this phrase in any case where the possible sale of 35 cent oil is indicated. The customer might buy 30 cent oil and thus boomerang the stunt but it should serve to maintain the sales of one or another of the premium grades of motor oil.

* * *

Doctor, Lawyer, "Merchant"

Rich man, poor man, beggar man, thief.
Doctor, lawyer, merchant, chief.
So starts a nursery rhyme.

Notice where the merchant is listed. Among the professions. And being a good retail merchant is a profession that requires as many years of study as do the legal and medical professions.

Service station men are not always looked upon as being merchants. Perhaps it is because of the fact that the average station operator is a younger man than the druggist or the grocer. Or possibly because the better class neighborhood stations were for so many years company operated. Be that as it may the service station dealer *is* a merchant and as such has a definite part to play in the community system.

Ordinarily the druggist will trade with his neighboring hardware man as a matter of policy. The local grocer may have slightly higher prices but other merchants will give him some business in order to maintain a friendly relationship.

The amount of money spent by one retailer with another is rather immaterial. The significance lies in the gesture itself.

These are but a few of the traditional and time honored policies of many merchants.

What happens when a service station merchant fails to enter into this neighborhood alliance? When he is indifferent to the operations of other retailers? When he cannot be bothered with spending some of his income in his own neighborhood?

Sooner or later he will be classed by the better merchants in the neighborhood as an outsider. He will be talked about. Not only will he forfeit the business of individual retailers, incensed at his lack of co-operation, but often merchants will actually band together and agree to boycott the offender.

When the service station merchant is not on the friendliest of terms with other retailers he cannot go to the druggist, hardware dealer, or grocer and say; "Charley I see you've put in a line of anti-freeze. I don't think that's right. You're getting into my territory. Why don't you give me a break, and drop that line?"—and expect results. As a matter of fact, Charley sometimes wouldn't have put in the anti-freeze in the first place if the service station man had been playing ball.

There are exceptions to these co-operative policies, of course, but by and large they work out to the mutual benefit of the merchants involved in the plan. And it is not strange that the loyal merchants are generally the more successful ones.

Stop, then, and think, Mr. Service Station Merchant. Are you spending enough of your income in your own neighborhood. Where do you buy your cigarets, camphorated oil, hair cuts, roofing nails or hard likker?

How did Mr. Schmidt, the furniture man, make out with his January sales? Hadn't you better drop by and pass the time of the day with him?

Can't you persuade Larry, the chain store manager, to hide those cans of the branded oil of his house behind a sack of Idaho potatoes?

Are you doing what you can to maintain your position as a progressive neighborhood merchant?

New Equipment

AND THE MANUFACTURERS

Grease Dispenser

Designed to meet present lubrication needs, The Cincinnati Ball Crank Co., Cincinnati, is introducing three new grease dispensers. These dispensers are known as the Model 140 gear lube dis-

penser pump; the Model 120 gun filler pump; and the Model 130 spring packer pump.

The illustrated Model 130 has a 30-pound container and follow plate to handle graphite lubricants. It is equipped with a 6-foot wire braided grease resisting hose and a single straight swivel, with automatic anti-drip pin type chuck. It is recommended for universal joint lubrication when equipped with hydraulic adapter or oil nozzle.

* * *

Accessory Bluebook

Chek-Chart Corp., Chicago, has issued its Chexall Accessory Bluebook, which provides oil companies and service stations with complete specifications of all essential accessories recommended for the various makes and models of automobiles. The book, of nearly 350 pages, also includes material on the display and merchandising of accessories, inspection and installation instructions, and an anti-freeze proportion table, among other features. The book is of handy size, with a binding which allows the convenient use of all pages. It is to be published annually.

* * *

Makes Service Tools

Division of the operations of Globe Machinery & Supply Co., as the result of continued expansion of its auto hoist business was consummated recently with the formation of two corporations.

Garage equipment, including hoists, "Rock-A-Car" jacks, and other items will be manufactured by the Globe Hoist Co. at the Des Moines and Philadelphia plants.

The other corporation, under the old name, will handle the other divisions including power plant equipment, plumbing, heating, air conditioning, and insulation equipment.

Officers of Globe Hoist include F. W. Swanson, president and general manager; F. S. Harshbarger, vice president; H. A. Bruner, treasurer; and F. W. Swanson, Jr., secretary.

* * *

First Glass Encased Pump

An experiment in the use of an all glass encased pump is being tried out in Toledo by C. F. Sapper, operating engineer for Shell Petroleum Corp. Using an Erie pump because it was said to lend itself to better lighting than other pumps, the glass is fire-enameled on the inside with the familiar Shell red and white. Through this glass brilliant light at night flashes its message to passing motorists.

Ordinary glass, of course, would be unsuitable because of the breakage hazard. Tuf-Flex glass, a recently developed, laminated safety glass, which is used on this pump, can be bent and twisted like metal, it is said, resists breakage when molten lead is poured on the ice-cold glass, and does not chip. Libbey-Owens-Ford Co. is manufacturer of the glass.

* * *

Pistol Lubricators

Senacon pistol balanced power lubricators, announced by the Smith-Johnson Corp., Los Angeles, are said to embody many time and money saving advantages in servicing automobiles.

Chief among distinctive features of the unit are quick change connections, "instant change" lubricant containers, and

balance similar to an automatic pistol. Another feature is ability to handle both light and heavy lubricants with equal ease, it is said.

The lubricator has a single shot action giving a steady push to the grease instead of a series of "shock shots," and a high economy of grease utilization due to the metering effect of the single shot action. Free arm operation results from the position of the air hose.

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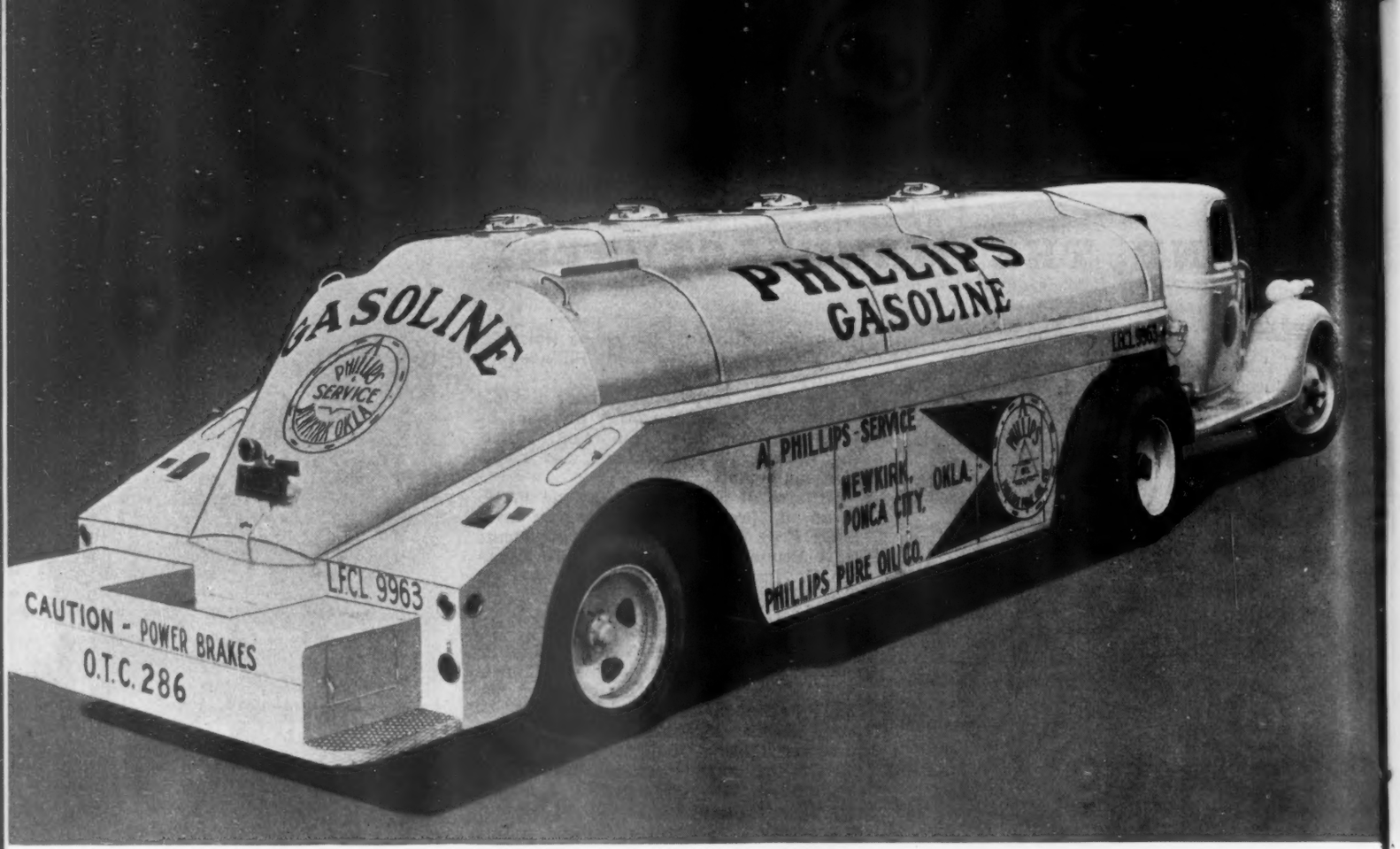

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The problems involved in hauling liquid loads are so different that you cannot strap a tank body on a frame, especially a trailer frame, and get safe, long-life, low-cost transportation.

Every day Butler engineers (the oldest, most capable staff in the business) are helping oil men and contract haulers correct such mistakes of the past.

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In Butler Truck and TrailLow-Tanks you not only get custom-built units but as well units from which every possible pound of deadload has been engineered out.

Take for example just one of the exclusive Butler features of construction—*the Turret Dome*. It greatly increases structural strength. Formed directly into the shell of the tank it actually functions as a load carrying and stress resisting member. It is not just a false housing atop the tank.

The Turret Dome also equips each compartment of the tank, whether long, medium or short, with an expansion chamber running its full length and providing expansion space in direct proportion to its capacity. On a volatile liquid load in motion this is a highly important safety factor. Avoid the risk of dangerous false housing over fill openings put there only for streamline effect.

The many advanced engineering features of Butler Truck and TrailLow-Tanks make it more than worth while to figure with Butler engineers before you buy any highway oil transportation unit. There is no obligation. We invite inquiry.

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INTERNATIONAL

Petroleum Technology

Current Technical Developments
Edited for All in the Oil Industry

Huge Quantities of Chemicals Used by Oil Industry

By ARCH L. FOSTER, Technical Editor

● The petroleum refinery is fast becoming a chemical factory, a fact that has been pointed out many times in these pages. But what is frequently not realized even by the initiated is that the refining industry is fast becoming a chemical market as well. This latter development has been of such gradual though persistent and continuous development, that few of us have taken the time to sum up all that has occurred in recent years.

Twenty years ago the different chemicals of all sorts used in the refinery numbered less than half a dozen—sulfuric acid, caustic soda, litharge, filter clay, practically cover the list. We treated gasoline, kerosine, lubricating oils with sulfuric acid if necessary, neutralized with caustic solution, "sweetened" gasoline with doctor solution maybe, involving the use of litharge or lead oxide, PbO, washed and the job was finished.

The 1937 picture has grown immeasurably more complex. Crude is treated chemically or electrolytically to remove salts, sediment and water before reaching the main heating unit; alkalies such as caustic or ammonia are injected into the stream or vapor beyond the still to eliminate or reduce corrosion in towers and condensers. Any one or more of an imposing list of chemicals may be used in treating light or heavy distillates to improve color, gum, demulsibility of heavy oils, viscosity index, pour point; dyes are used to further improve color or bloom. Filter clays of a half-dozen sorts clarify and decolorize; other clays eliminate undesirable waste products, (polymers), in vapor or liquid phase.

Inhibitors blanket the formation of gums, maintain anti-knock rating, or eliminate formation of corrosive oxidation products in service or storage. Dyes also prevent the slight off-color tendencies which affect the customer's opinion but not the usefulness of motor fuels.

Catalysts make possible the polymerization of gases otherwise disposable only as waste or cheap fuel products. Synthetic chemicals avoid the necessity for severe and complete dewaxing with resultant loss of most efficient lubricating constituents. Dewaxing solvents reduce costs and speed up the efficient removal of paraffin waxes without removing desirable oil. Selective solvents separate more efficiently than any other means the good from the bad lubricating portions of oils; ten million pounds of these solvents were bought by the refining industry in 1936 alone.

So-called "oiliness" or "film strength" chemicals to the extent of hundreds of tons were added to produce lubricants for which strong claims of superior qualities are made by several

IPT Contents

Viscosity Conversion Charts Use Temperature Relations ..... By Richard Grosholtz 151

Tedious calculations involved in problems dealing with viscosities is eliminated by use of a series of conversion charts in which temperatures common to each system are used.

Butane Used as Refrigerant in Home Air Conditioning Installation 157

A Tulsa engineer has been cooling and air conditioning his home with an automatically operated plant which uses Butane as a refrigerant.

Reviews of New Refining Patents 159

of the largest and most reputable companies. Extreme pressure lubricant bases are used in large quantities.

Note the types and classes of chemicals now used universally or widely in refinery processing.

1. Emulsion breaking chemicals, as acids or colloidal materials, for treating crudes.

2. Corrosion-preventing alkalies—as caustic, ammonia, lime.

3. Light distillate chemicals—doctor solution, lead sulfide, copper chlorides, zinc chloride, phenolic solutions and numerous others.

4. Natural and synthetic filter materials—clays for decolorizing, for polymerizing vapors, for contact in liquid phase.

5. Catalysts for polymerization of gases—for cracking liquid hydrocarbons—as aluminum chloride, the earth catalysts of the Houdry process, etc.

6. Gum inhibitors—as wood distillate products, amines and other nitrogen compounds, aromatic derivatives and other synthetics, all totaling many tons each year.

7. Dyes of aliphatic and aromatic derivation, some for color maintenance, others for both color and inhibiting action as well.

8. For heavy distillates and residuals—extraction solvents, as phenol, furfural, the cresols, nitrobenzene, Chlorex, sulfur dioxide, benzol, crotonaldehyde, totaling thousands of tons per year.

9. Dewaxing solvents—ethylene dichloride, carbon tetrachloride, trichlorethylene, acetone and higher ketones, benzol, propane made by refiners themselves, all totaling thousands of tons yearly.

10. Corrosion-oxidation inhibitors to prevent or delay formation of corrosive products in service.

11. "Film Strength" additive compounds, as halogenated fatty acids, organic phosphate salts as tricresyl phosphate, halogenated aromatics as chlor-diphenyl and -phenyl oxide, oxidized hydrocarbon derivatives of complex composition.

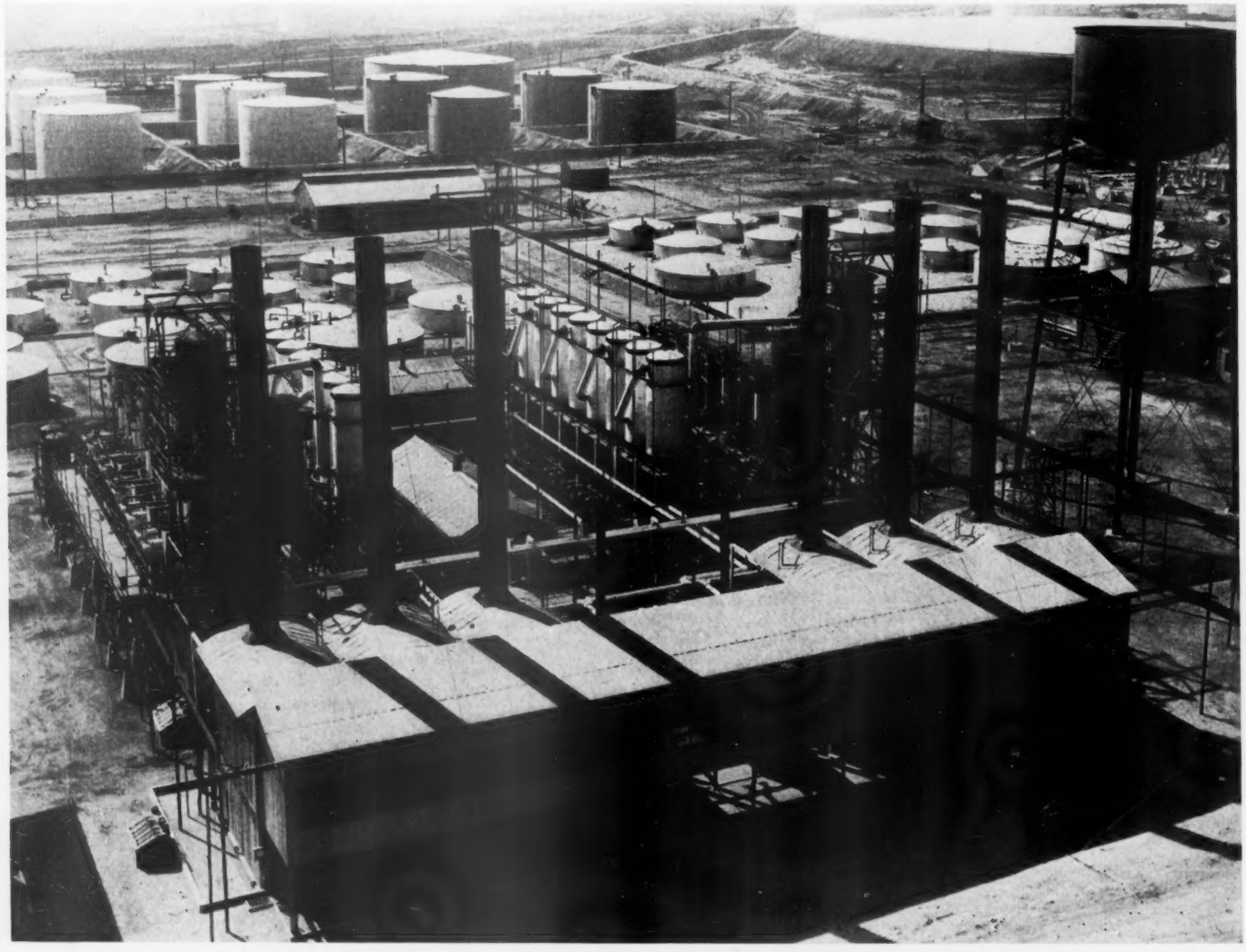
12. Extreme pressure bases, including lead soaps, molecular and active sulfur, chlorinated materials, synthetic organic products; soaps and other additives for manufacture of the simpler greases, caustic soda, potash, aluminum salts, lime, lead oxide and salts, lard oils, degras, fatty acids and derivatives, etc.

13. Pour point depressants, as Paraflow, Santopour, and other commercial products.

14. Gas purifying chemicals and processes, as ethanolamines, phenol and phenolates, and numerous others.

This list is by no means complete, taking no notice of more special chemicals used for more specialized purposes, but both the number and quantities of chemicals involved reach enormous proportions, cost millions of dollars, and constitute a dependable signpost showing the trend of technology in oil refining methods.

And the end is not yet. The application of chemistry and chemicals, of engineering and metallurgy to the refiners' problems is still in its infancy.



Main crude distillation unit at Shell Oil Co. refinery at Dominguez, Calif. Two continuous still batteries, where the charge progresses from one still to the next, vaporizing in turn successively higher boiling fractions to be further processed in other refinery units

Viscosity Conversion Charts Use Temperature Relations

By RICHARD GROSHOLTZ*

MUCH of the tedious calculation incidental to technical and control laboratory work in dealing with viscosities, viscosity index, and similar data can be eliminated by the reduction of formulas to alignment charts, especially if the chart is enlarged to promote accuracy of determination. One of the most disturbing problems without charts is conversion of viscosity units for one viscometer into corresponding viscosity units for another viscometer. Charts commonly used for this purpose convert viscosity at a common temperature which, in one system of the other, is likely not to be the customary temperature used.

In the accompanying charts, this problem is solved by making the conversions with temperatures customary to each system of viscosity determination. This requires that viscosity be known at two temperatures in the system from which conversion is to be made. The charts take further advantage of this fact to provide a quick determination of viscosity index.

The derivation of the curves is explained only briefly, without going into mathematical details, since the charts are largely graphical construction upon the previously developed A. S. T. M. viscosity-temperature chart and the Dean and Davis viscosity index development. Examples are given to illustrate the use of the charts and the discussion is briefed to avoid confusion.

A means of converting viscosity data from one system to another at the temperatures commonly used with each instrument is provided by the accompanying charts, Figures 1, 2, and 3. In addition, these charts provide for the de-

*Ardmore, Pa.

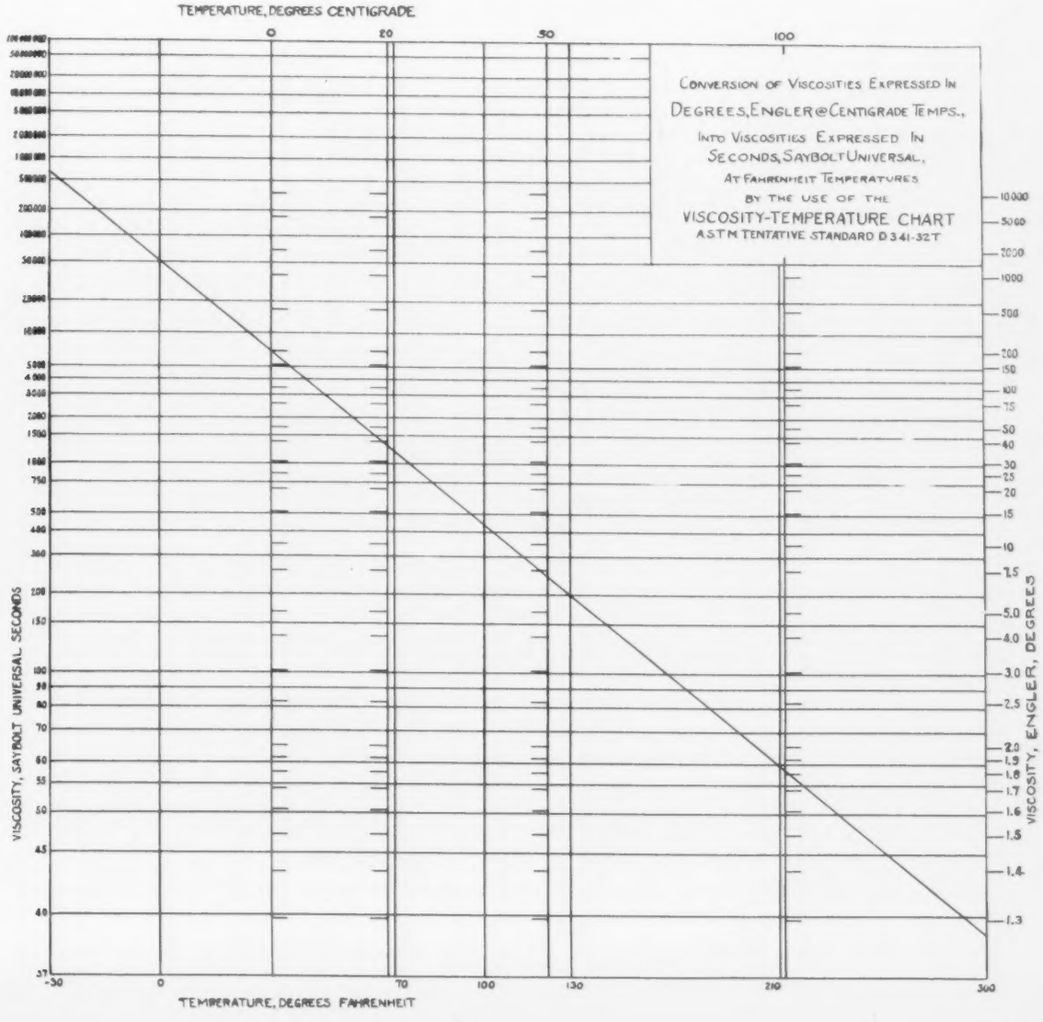


Fig. 4 showing how viscosity scales in Engler degrees are located in the Saybolt-Engler conversion chart (Fig. 1) by use of the A.S.T.M. viscosity-temperature chart

termination of viscosity index. Conversion from Saybolt Universal to Engler, Redwood, and Kinematic viscosities or the reverse is possible with these three charts.

To use the charts, points on each of two scales corresponding to viscosities in one system at two known temperatures, are connected by a straight line which will intersect all the scaled lines on the chart. From this line corresponding viscosities in the other system may be read at any of the customary temperatures.

This straight line also crosses curved viscosity index lines. If the length indicated on the chart as "Radius" is laid out on the straight line from the intersection of the straight line with the 210 F. Saybolt Universal scale line, the other end of the laid off length will indicate in the curved lines the viscosity index of the oil.

As an example, there is given for 0 F. and 100 F. the respective viscosities of 37,500 seconds and 300 seconds Saybolt Universal. The line drawn through these two values in Fig. 1 yields the following Engler viscosities: 135 degrees at 0 C., 26 degrees at 20 C., 5.1 degrees at 50 C., and 1.55 degrees at 100 C.

The "Radius" length on this line indicates a viscosity index of 70. The line also indicates Saybolt Universal viscosities at other customary temperatures: 820 seconds at 70 F., 140 seconds at 130 F., and 49.5 seconds at 210 F.

Conversion at a fixed temperature is provided in the usual published table or chart. This is often inconvenient because the temperature may be customary for one method and not for the other. Such a chart was published in National Petroleum News July 10, 1935. To accomplish the same results with this chart it is necessary to use it with the viscosity-temperature chart of the American Society for Testing Materials. The accompanying charts require data related directly with viscosity index and therefore are convenient for supplying this additional information.

The method by which the diagrams are drawn is illustrated in Fig. 4, which is a reduced reproduction of the regular A. S. T. M. chart with only a few of the principal lines showing. This chart is drawn in such a manner that a plot of viscosity against temperature for any given oil is a straight line. This straight line relation still holds if equivalent Engler or other scales are superimposed at any desired temperatures. The desired Engler scales are shown positioned at the customary temperatures indicated in Centigrade degrees. Each scale is identical with the Engler scale at the right just as the horizontal lines carry the Saybolt scale to all temperatures. In the completed charts the division lines of the Saybolt Universal scale are shortened in the same style as the Engler scales shown in Fig. 4.

The principle involved in the determination of viscosity index (V.I.) is illustrated in Fig. 5. From the Dean and Davis table of viscosities of average Coastal and Pennsylvania oils, the oils having a common viscosity of 55 seconds Saybolt at 210 F. are selected for illustration. The Coastal oil, indicated as L for low V.I., has a viscosity of 596 seconds at 100 F., the temperature at which the index is computed. The Pennsylvania oil, indicated as H for high V.I., has a viscosity of 339 seconds at 100 F.

The divergence of the viscosities of these two oils is shown on the 100 F. line of Fig. 5 and indexes of 0 and 100 are indicated. Any other oil which has a viscosity of

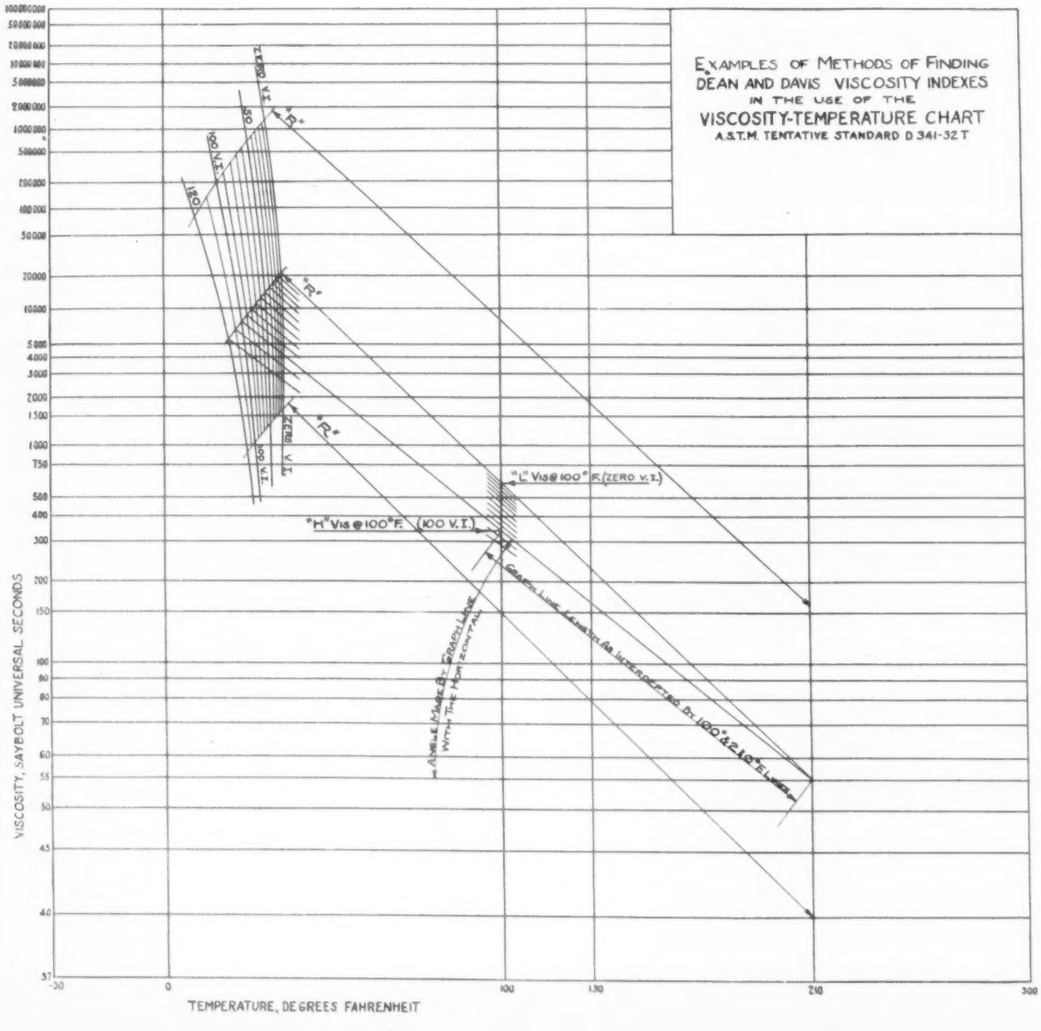

EXAMPLES OF METHODS OF FINDING
DEAN AND DAVIS VISCOSITY INDEXES
IN THE USE OF THE
VISCOSITY-TEMPERATURE CHART
A.S.T.M. TENTATIVE STANDARD D 341-32 T
"L" Vis @ 100° F. (ZERO V.I.)
"H" Vis @ 100° F. (100 V.I.)
VISCOSITY, SAYBOLT UNIVERSAL SECONDS
TEMPERATURE, DEGREES FAHRENHEIT

Fig. 5 this diagram, drawn on an A.S.T.M. viscosity - temperature chart, illustrates the manner of determining viscosity index in Fig. 1, 2 and 3

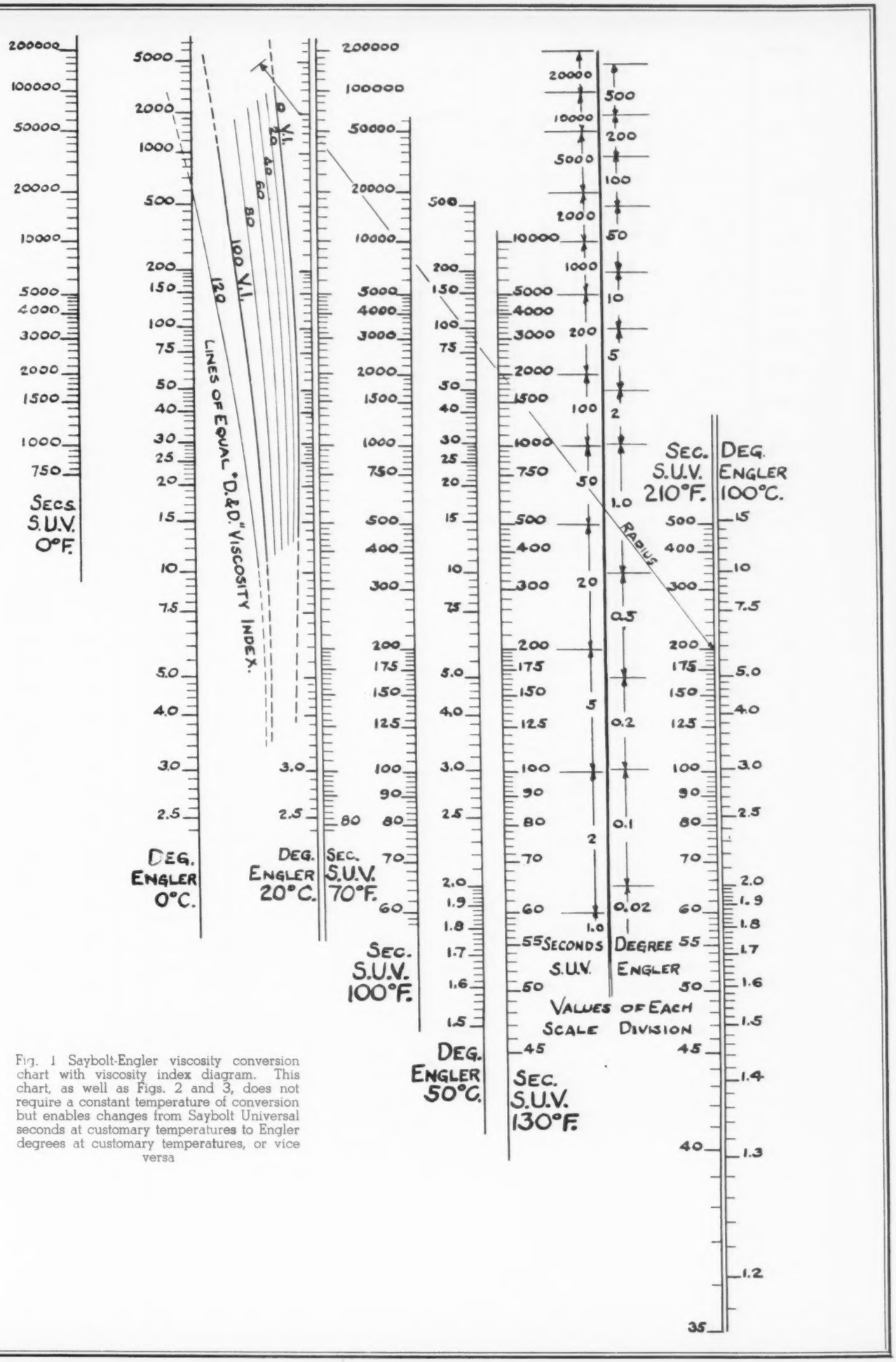


Fig. 1 Saybolt-Engler viscosity conversion chart with viscosity index diagram. This chart, as well as Figs. 2 and 3, does not require a constant temperature of conversion but enables changes from Saybolt Universal seconds at customary temperatures to Engler degrees at customary temperatures, or vice versa

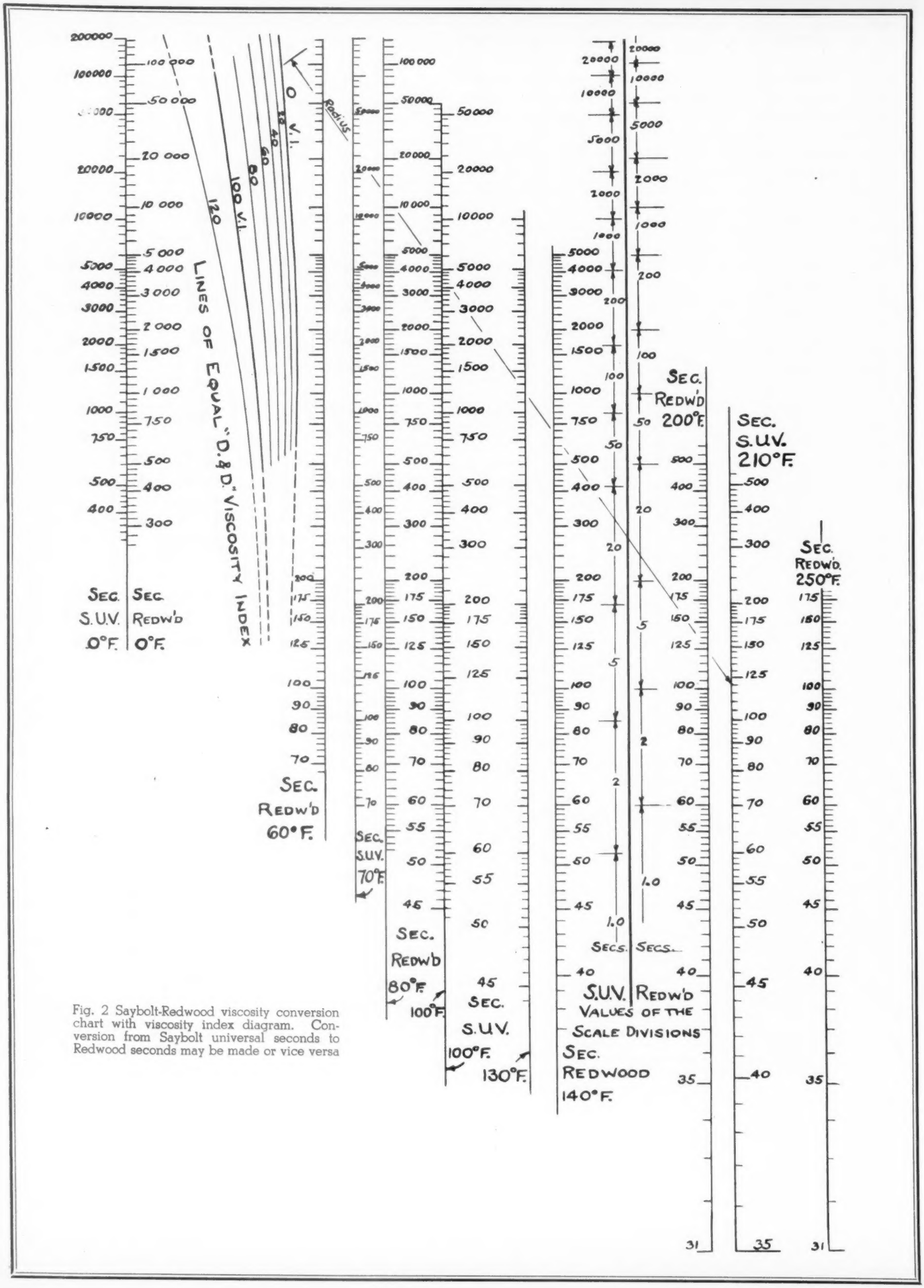


Fig. 2 Saybolt-Redwood viscosity conversion chart with viscosity index diagram. Conversion from Saybolt universal seconds to Redwood seconds may be made or vice versa

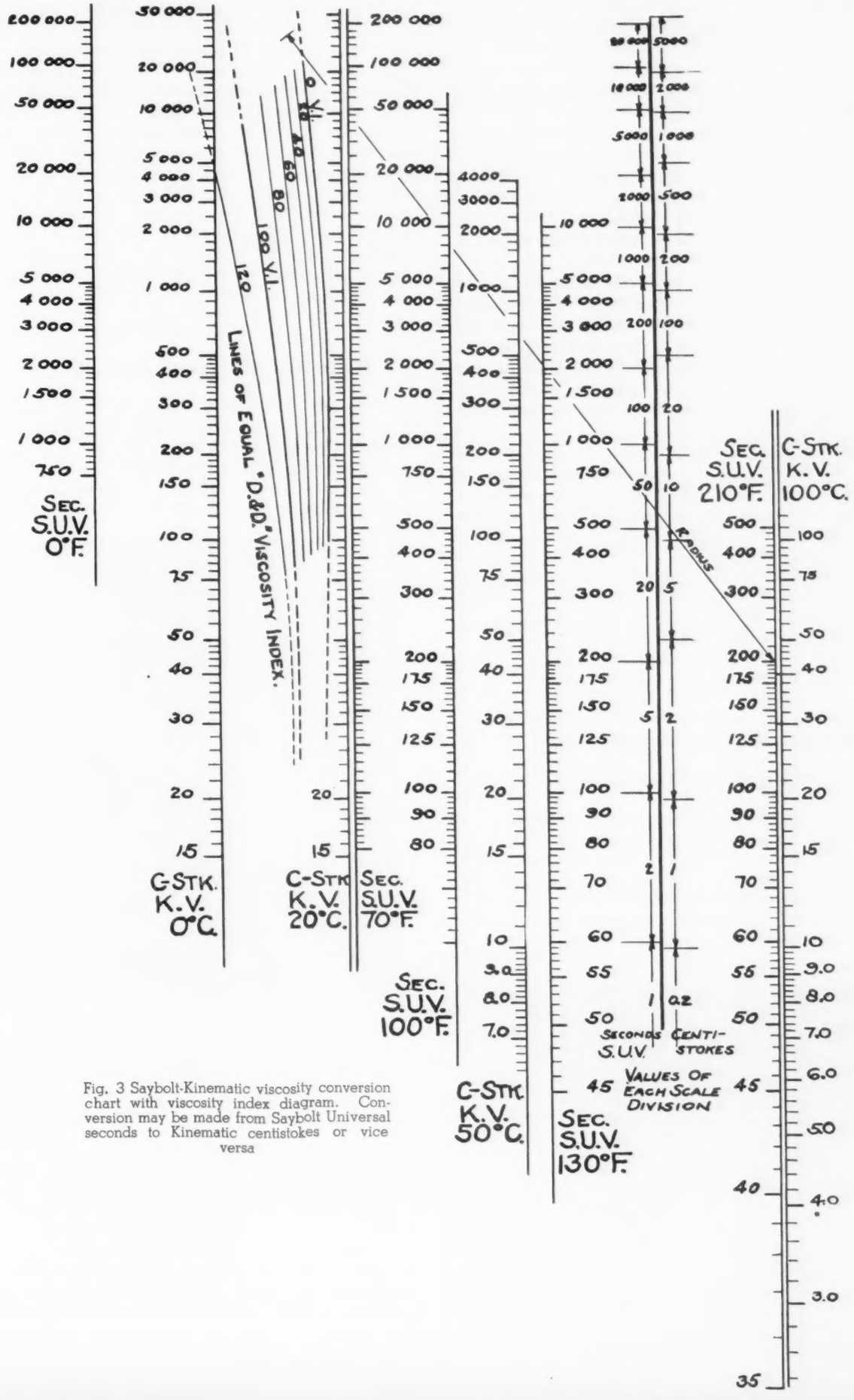


Fig. 3 Saybolt-Kinematic viscosity conversion chart with viscosity index diagram. Conversion may be made from Saybolt Universal seconds to Kinematic centistokes or vice versa

55 seconds at 210 F. ordinarily would be plotted between these two extremes. The V.I. of the oil would be, as a consequence, between 0 and 100 and would be determined by a numerical proportion of the range from 0 to 100. Thus, for an oil having a viscosity of 400 seconds at 100 F. and 55 seconds at 210 F., V.I./100 = (596 — 400) / (596 —339) = 196/257. V.I. = 76.2. Oils outside the range from 0 to 100 can be computed by extrapolation.

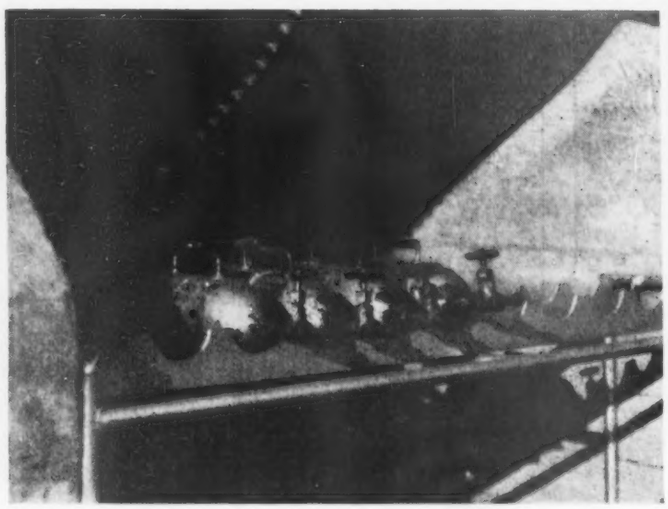
The space between 0 and 100 V.I. on the 100 F. line in Fig. 5 is divided into ten parts representing indexes of 10, 20, 30, etc. These divisions are not of uniform size as is indicated by the computation because the viscosity scale on which it is drawn is not uniform. With these division lines any oil having a viscosity of 55 seconds Saybolt at 210 F. can be read off directly without computation.

Similar diagrams could be made for other oils having other viscosities at 210 F. Since this would be impractical, the division lines are projected upon an arc drawn at any radius "R" centering on the 210 F. line of the chart. The whole process is repeated for two other typical Coastal and Pennsylvania oils included in the Dean and Davis table which have viscosities of 40 and 160 seconds Saybolt at 210 F.

The construction lines are not shown in Fig. 5 for these two cases but the division lines are indicated on the arcs generated by the radius "R" from these two points on the 210 F. line by the curved lines which intersect all three positions of the arcs. Still greater accuracy would result if more than three arcs were used. The radius is therefore applicable to any point on the 210 F. line and its slope for any given viscosity will determine in the "curve net" the viscosity index of the oil. This system has been incorporated in each of the three viscosity conversion charts.

Bomb Rack Simplifies Sampling Routine

Sample bombs used by the natural gasoline manufacturers in California have been standardized and are made up with a uniform shape, size and capacity. They are made with handles for convenience when handling, and equipped with nipples and needle valves for filling and removing the gasoline. The Texas Co. Gasoline Department maintains a central testing and research laboratory in Signal Hill, where all gasoline is taken for examination, whether it is manufactured in Monte Bello or Long Beach.

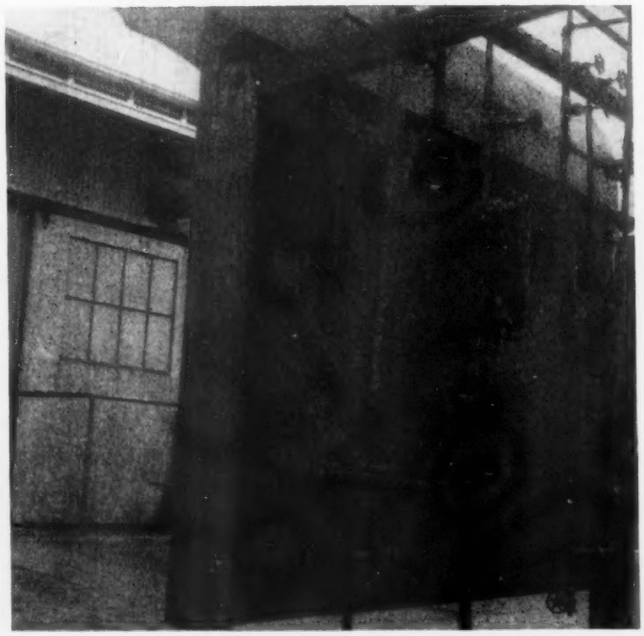


Gasoline sample bomb rack used by The Texas Co. (Cal.) in its No. 14 gasoline plant at Monte Bello, Calif.

To make it convenient for laboratory employes to obtain samples of the different tanks in storage, or current manufacture, a number of bombs are kept on hand. Storage of these bombs is made easy by utilizing a simple rack, built beside the storage tank battery to hold a dozen bombs, so that several are always available for filling when necessary. Two pieces of flat steel were used, with semicircular notches cut regularly in one side, mounted upon a frame of pipe which fits snugly between the piers that support one of the horizontal storage tanks. The rack was placed at the end of the battery nearest the gage cocks and displacement sample fittings so that empty bombs are readily obtainable, and filled ones tagged and laid upon the rack so they may be removed and taken to the laboratory for distillation and inspection of the gasoline.

Remote Control for Steam Line

When O. C. Field Gasoline Co. built its new gasoline plant in Huntington Beach, Calif., to process new gas production from tideland drilling, the type of still selected required the process steam line to be connected at a point about 8 feet above the foundation. To make it unnecessary for the operators to use a ladder each time more or less steam was needed in the still, a remote control unit was installed on the instrument board, convenient to the operator's hand.



Model T Ford Ring Gear and pinion used by O. C. Field Gasoline Co. as remote control mechanism to operate globe valve on process steam to still in its Huntington Beach Gasoline Plant

The control in the steam line is the usual globe valve, but in this instance was installed with the stem looking down so an extension rod might be connected to it leading from it to the control board. To obtain close regulation, of micrometer like precision, a ring gear and pinion, with part of the differential case from a discarded automobile, was mounted on the back of the instrument board with the necessary braces to prevent vibration and to obtain a close fit between the gear and pinion. The stub shaft of the pinion was extended through the control panel, and equipped with a knob so that adjustment might be made easily. Obviously, the cost was small, but results obtained are quite satisfactory to the operators of the plant, and the company.

Butane Used as Refrigerant In Home Air Conditioning Installation

By ALLEN S. JAMES
N. P. N. Staff Writer

NORMAL butane, now in such popular demand as a liquefied petroleum gas because of its efficient and dependable heating qualities, has proved itself equally desirable in just the opposite role—that of refrigerant in an air conditioning unit.

Practical demonstration of the adaptability of butane to air conditioning is to be found in the Tulsa home of Paul M. Raigorodsky, where an experimental unit built more than a year ago has been developed into an economical and efficient system so successfully that an application has been made for a patent.

Only to the layman is it necessary to explain that Mr. Raigorodsky, head of Petroleum Engineering, Inc., has been one of the pace-setters in the development of methods and equipment for the recovery and utilization of many of the lighter hydrocarbons which formerly constituted a portion of the "losses" at both refineries and natural gasoline plants.

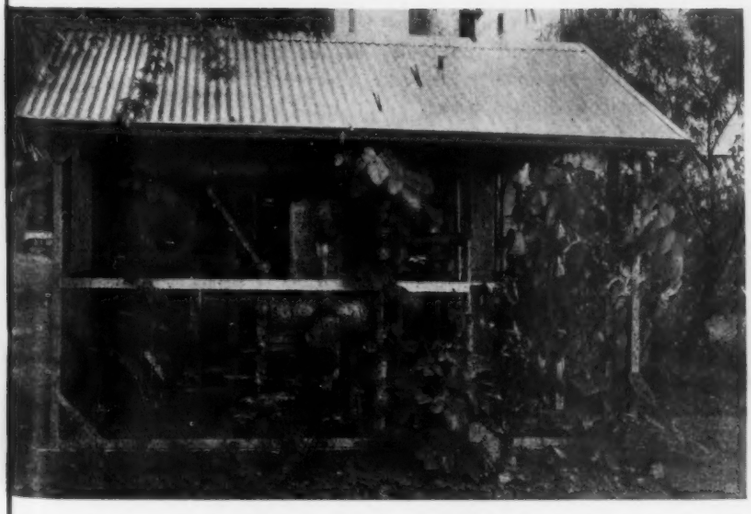
It was only natural, therefore, when air conditioning began to get a foothold and he decided he wanted to enjoy its comforts in his home, that Mr. Raigorodsky and his assistant, W. A. Stover should use their knowledge of those hydrocarbons with which they have every-day dealings, along with their engineering ability, to plan and construct their own air conditioning unit.

The installation's design is similar to the conventional ammonia absorption system used in the manufacture of ice, except that butane and octane are used instead of ammonia and water for the circulating mediums. With butane, it was explained, it is possible to obtain temperatures in the evaporator as low as 35 to 40° F., when operating the evaporator at atmospheric pressure. Low pressures would not be desirable due to possibility of air leaking into the system.

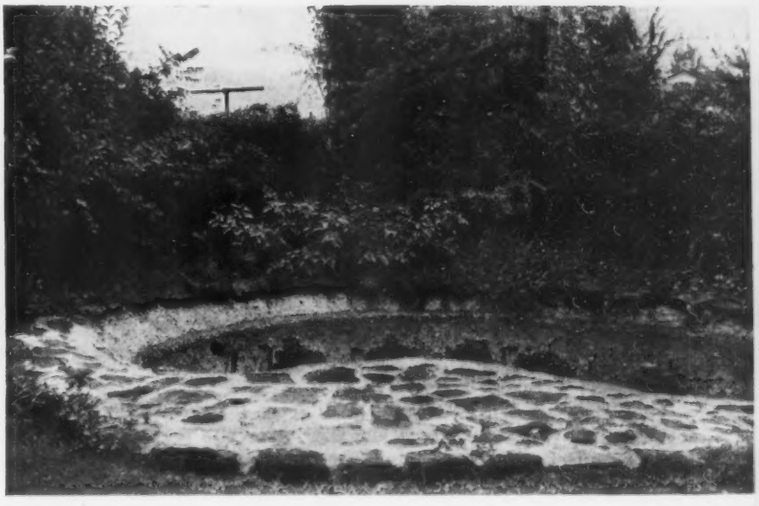
A hydrocarbon having the characteristics of octane is used for the absorbent. This liquid has a relatively low boiling point, which enables the still to be operated at a temperature around 250° F. This low temperature does not cause the absorbent to disintegrate and coke the pipes and tubes. These two hydrocarbons also give a high degree of separation when using only single flash vaporization, thus eliminating the necessity of an elaborate fractionating apparatus and reducing the fuel consumption to a minimum.

Now all this preliminary description, together with the accompanying flow sheet, may give one the impression this unit is as big as a house and takes up a lot more space than the average home owner has around his place. But that impression is removed by a careful study of the description of the various pieces of equipment. The steam boiler's shell, for example, is not much larger than the coffee urn in a restaurant. The heat exchanger shell is made of 3-inch standard pipe with the tubes of 1-inch pipe. The refrigerant condenser is a six-foot section of 13-pound casing, 7 inches outside diameter. That is why the whole unit, with the exception of the plenum chamber, the boiler, and auxiliary equipment in the basement, is located on a concrete foundation about 6 by 12 feet, just back of Mr. Raigorodsky's garage. A steel framework supports the sheet iron roof over the equipment.

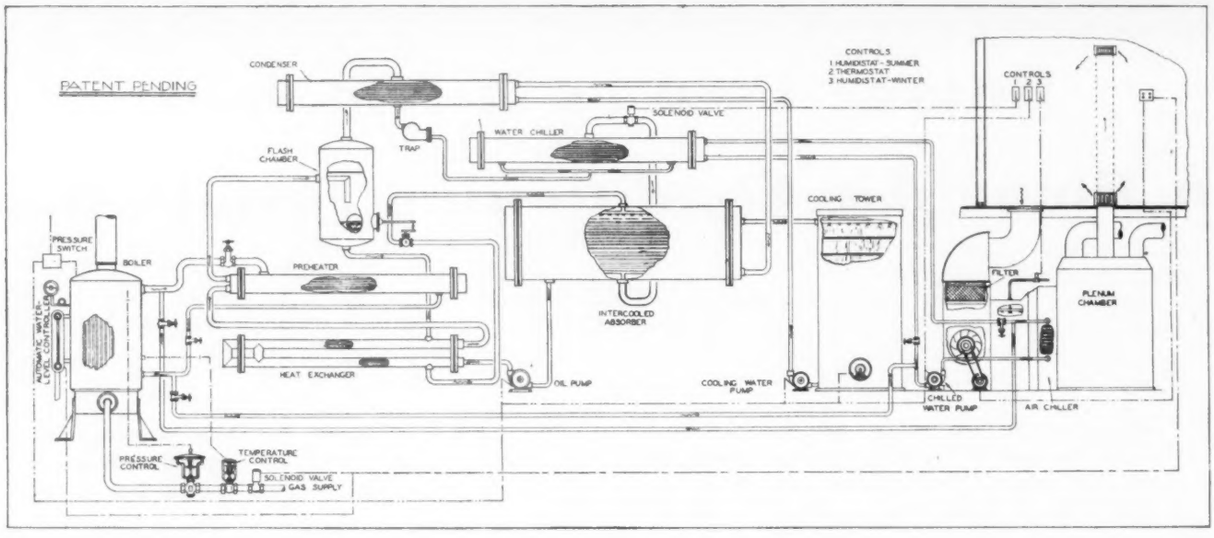
The only moving parts are small pumps, thus reduc-



In one corner of the back yard, and behind the garage, is the "shed" which contains the refrigerating unit for the air conditioning system. This 6 by 12 foot building will be covered completely by vines and hidden by shrubbery within another season



This decorative spray pond in another corner of the garden is utilized in the cooling of the water which is circulated through the condenser. This picture, taken after the pool had been drained for cleaning, shows the spray jets and the float valve which regulates the water level in the pond



Flow diagram of refrigerating and air conditioning unit.

ing vibration and noise to a minimum, a very desirable factor in a unit for air conditioning a residence.

The pre-heater, or still, used for the purpose of separating the butane and octane, is of the steam heated type. No flame comes in direct contact with any part of the system containing the hydrocarbons, the steam being generated in the boiler by gas heat and piped into the preheater. A constant temperature of about 250° F. is maintained in the pre-heater by controlling the steam pressure. This is accomplished by placing a gas regulating valve on the fuel line to the boiler. Steam pressure of about 25 pounds is sufficient for maximum operating conditions.

The accompanying flow diagram illustrates the refrigeration process and air conditioning system as a whole. Starting with the intercooled absorber, where the butane and octane are mixed, the mixture or rich oil is pumped through the tubes in the heat exchanger where its temperature is raised to 200 to 210° F. The rich oil then flows through the tubes in the pre-heater where it is raised by steam heat to a temperature of approximately 250° F. The hot, rich oil then enters the flash chamber where the butane passes off the top as a vapor and the octane, or lean oil, leaves at the bottom through a trap. This hot, lean oil then passes through the heat exchanger on its way back to the intercooled absorber where it again picks up the butane.

The butane vapor, on leaving the flash chamber, enters the condenser where it is cooled and condensed by water circulating through tubes. The liquid butane then passes into the water chiller. The tubes in the water chiller, through which water is constantly circulated, are immersed in the liquid butane. Since butane boils at around 32° F., the butane liquid within the water chiller is constantly boiling, and as the butane evaporates, the amount depending upon the cooling load, the vapors are piped into the intercooled absorber.

The cool lean oil, which has passed from the bottom of the flash chamber through the heat exchanger, is sprayed into the absorber while the butane vapor enters through nozzles, insuring thorough mixing and efficient absorption. Cooling water is circulated through tubes in the absorber to absorb heat of solution which is liberated. The cooler the contents of the absorber, the lower the pressure, and the more efficient the absorption will be.

That completes the cycle for the two hydrocarbons used in the refrigerating process.

The air conditioning is accomplished by continuously chilling and circulating the air in the rooms. A fan in the air duct system draws the air from the rooms through a filter, then forces it through the air chiller and into the plenum chamber, from which enclosure it returns, cooled and cleaned, to the rooms.

The air chiller is of the fin type, through which is circulated the water from the water chiller. This water has been reduced, in its passage through the tubes immersed in boiling butane, to a temperature of approximately 50° F.

A cooling tower for the circulating cooling water is shown in the diagram. Mr. Raigorodsky solved this cooling water problem, however, without having to have an unsightly atmospheric cooling tower, or a forced draft type of cooler. He has constructed, in one corner of his back yard, a decorative spray pond which has proved entirely satisfactory and much less expensive than a cooling tower.

It will be noted from the diagram that the system is as automatic as possible. Control of temperature is obtained by means of a thermostat located in one of the rooms. This thermostat starts and stops the cold water pump motor. The humidity during the summer is controlled by means of the temperature of the circulating cold water. This function is performed by varying the pressure in the water chiller by means of a valve in the butane vapor line to the absorber.

To have the cooling system operate it is only necessary to press a switch located at any convenient place in the house. This switch opens a solenoid valve in the gas line to the boiler. As the pilot flame is left burning the gas at the burner ignites and the boiler begins generating steam. When the boiler pressure reaches a predetermined value a pressure switch closes which puts into operation the oil pump, the thermostatically controlled water pump, and the circulating cooling water pump. When it is desired to shut down the system it is only necessary to turn off the switch in the house, which closes the solenoid valve. The boiler pressure will decrease until the pressure switch opens and turns off all the motors.

During the months when heat is required, the cooling system is "cut out," and the boiler becomes a hot water heater by being operated at atmospheric pressure. This hot water is pumped directly through the fin type air cooler, which in this instance becomes the air heater. The circulation of the heated air through the house is accomplished in the same way the cooled air is circulated during the summer months. The temperature of the hot water is controlled by a self-acting temperature controller which controls the amount of gas fed to the boiler. A humidistat located in the house controls a valve in the water line to the sprays in the

spray chamber. This insures a complete control of temperature and humidity.

While experimenting with the unit is was found that on many days it was not desirable to operate the cooling system, but that the operation of the fan and the circulation of the air alone provided comfortable conditions in the house. For this reason the fan motor is individually controlled by a switch in the house.

The cost of the original installation is estimated at approximately $2000. The operating cost for this unit, with a heat load based on the building of tile-stucco construction which was found to be equivalent to a 2-ton unit or two-thirds the capacity of the unit described, was found to be $114.70 for 1260 hours of operation. This is equivalent to 90 operating days of 14 hours each, at a cost of slightly less than 10 cents per hour of operation. The cost will vary, of course, depending on the utility rates in various localities.

REVIEWS OF NEW REFINING PATENTS

Stabilization. No. 2 063 082, issued Dec. 8, 1936; filed May 25, 1932; R. B. Day, assignor to Universal Oil Products Co.; one drawing and two charts; 5 claims.

• Process to eliminate gum-forming and colored compounds and sulfur-containing derivatives from distillates. Distillates are subjected at temperatures substantially above their normal initial boiling point to the action of hydrochloric acid in the presence of a chloride of a metal electropositive to hydrogen and chloride of a metal electronegative to hydrogen under sufficient pressure to preclude substantial normal vaporization and maintain a substantial portion of the oil in liquid phase during the treatment.

* * *

Stabilization. No. 2 063 113, issued Dec. 8, 1936; filed Aug. 22, 1934; J. C. Morrell, assignor to Universal Oil Products Co.; one drawing; 4 claims.

• Oil in the vapor phase is subjected to hydrogen in the presence of a catalyst to remove sulfur compounds. The resulting vaporous product is fractionated to separate the desulfurized gasoline from the hydrogen, hydrogen sulfide, hydrocarbon gases and hydrocarbons heavier than gasoline. The separated gasoline is subjected to a polymerizing agent comprising hydrochloric acid in contact with a metal to remove color and gum compounds.

* * *

Polymerization. No. 2 063 133, issued Dec. 8, 1936; filed July 30, 1934; H. Tropsch, assignor to Universal Oil Products Co.; no drawing; 5 claims.

• In the process gases are cracked in the presence of about one per cent of chlorine or carbon tetrachloride and under 400-1000 pounds pressure.

* * *

Carbon deposition. No. 2 063 596, issued Dec. 8, 1936; filed Feb. 13, 1933; Paul Feiler, assignor to I.G. Farbenindustrie Aktiengesellschaft; no drawings; 2 claims.

• In the thermal treatment of fluid hydrocarbons under carbon forming conditions, the step of heating the hydrocarbons in a vessel having metallic coatings on the metallic walls. Coatings are prepared by decomposing within the vessel a vaporized compound of the metal.

Compounds such as carbonyls and metal alkyls, as for example molybdenum carbonyl and lead tetra-ethyl, may be used. Volatile inorganic metal compounds such as chromyl chloride may be employed also.

* * *

Solvent extraction of gasoline. No. 2 063 597, issued Dec. 8, 1936; filed June 29, 1933; O. F. Simons and F. C. Croxton, assignors to Standard Oil Co. (Ind.); one drawing and one chart; 8 claims.

• Method of producing a high antiknock motor fuel from stock containing olefinic hydrocarbons boiling at 250-400° F. The stock is extracted with a solvent comprising a substantial amount of heterocyclic nitrogen base and a substantial amount of liquid sulfur dioxide. An extract phase is formed containing a higher concentration of the olefinic hydrocarbons and a raffinate phase containing lower concentration of the olefinic hydrocarbons. The extract and raffinate phases are separated and the heterocyclic nitrogen bas and liquid sulfur dioxide are removed from each of the said phases.

* * *

Granulated asphalt. No. 2 062 374, issued Dec. 1, 1936; filed Aug. 18, 1934; H. M. Noel, assignor to Standard Oil Development Co.; one drawing; 5 claims.

• Process for making granulated asphalt. Molten asphalt is mixed with liquid propane and passed into the upper portion of an enlarged container so that the asphalt is cooled sufficiently to be completely solidified into small brittle particles and the liquefied propane gasified.

Advantages are easy removal without destroying the shipping containers which are customarily cut open with an axe and easy handling in other respects.

* * *

Solvent fractionation. No. 2 062 872, issued Dec. 1, 1936; filed March 30, 1933; S. W. Ferris, assignor to The Atlantic Refining Co.; no drawing; 9 claims.

• Process for separating oils containing liquid paraffinic and naphthenic hydrocarbons into fractions. Oil is brought into contact with a solvent from the group of halogenated oxygen containing aliphatic compounds consisting of ethyl chloracetate, chloracetone, and dibrom propyl alcohol. Naphthenic oil dissolves in the lower solvent layer and is separated to be distilled. The remaining upper layer containing a relatively small amount of the solvent dissolved in the paraffinic portion of the oil is also distilled.

* * *

Dewaxing. No. 2 063 369, issued Dec. 8, 1936; filed Feb. 23, 1932; S. H. Diggs and J. M. Page, Jr., assignors to Standard Oil Co. of Indiana; one drawing; 9 claims.

• Process for removing wax from oil by adding dichlorethyl ether and separating the soluble naphthenic portions from the insoluble waxy portions at a temperature above the melting point of the oil-wax mixture. In the process the sulfur content is reduced, the viscosity index increased, and the sludge-forming tendency of the lubricating oil decreased.

* * *

Stabilization. No. 2 062 377, issued Dec. 1, 1936; filed Jan. 10, 1934; H. G. Schneider, assignor to Standard Oil Development Co., no drawings; 3 claims.

• Naphtha is agitated with boron fluoride and boron fluoride dissolved in sulfuric acid in an amount ranging from 0.06 to 0.15 pound per barrel to remove gum and sulfur and improve color. Time of contact is short because of high activity of boron fluoride.

* * *

Polymerization. No. 2 063 933, issued Dec. 15, 1936; filed Dec. 28, 1933; V. Ipatieff, assignor to Universal Oil Products Co.; one drawing; one claim.

• A combination cracking and polymerizing process. In the process products resulting from cracking are fractionated and the mixture of fixed gases and vapors of approximate gasoline boiling range is contacted with composite solid catalysts comprising phosphoric acid with siliceous material.

The process exerts control over the cracking step in that the lighter olefinic portions of the cracked products are controllably repolymerized to liquids boiling within the range of gasoline, thus increasing the overall yield from the process while the gasoline is simultaneously treated to improve quality.

* * *

High film strength lubricating oil. No. 2 063 880, issued Dec. 8, 1936; filed Jan. 22, 1934; B. H. Lincoln and A. Henriksen, assignors to The Lubri-Zol Development Corp.; no drawing; 5 claims.

• A lubricating oil containing a halogenated (preferably chlorinated) hydroaromatic compound. The compound is selected from the cyclo-olefins, cycloparaffins, and hydronaphthalenes.

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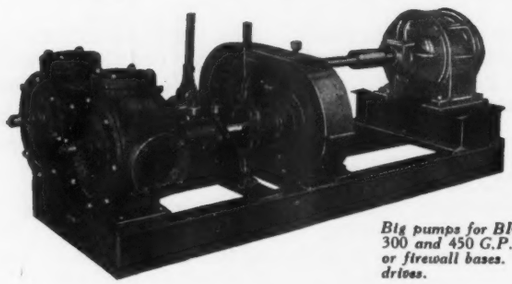

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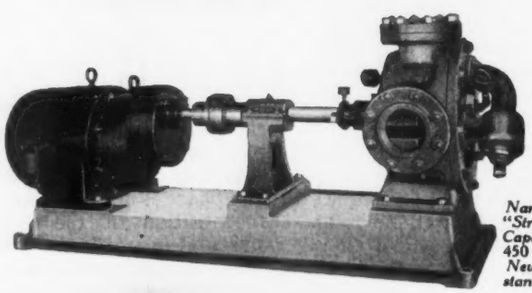

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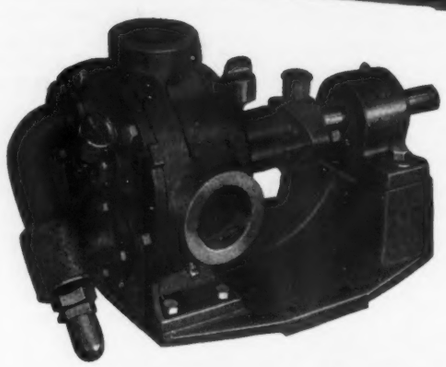

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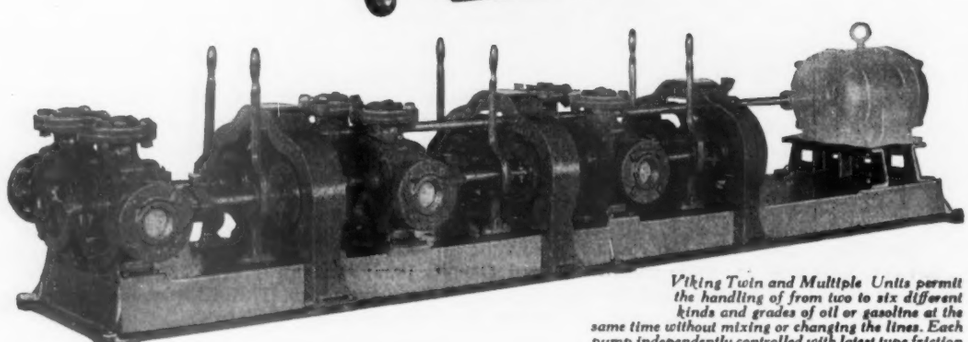

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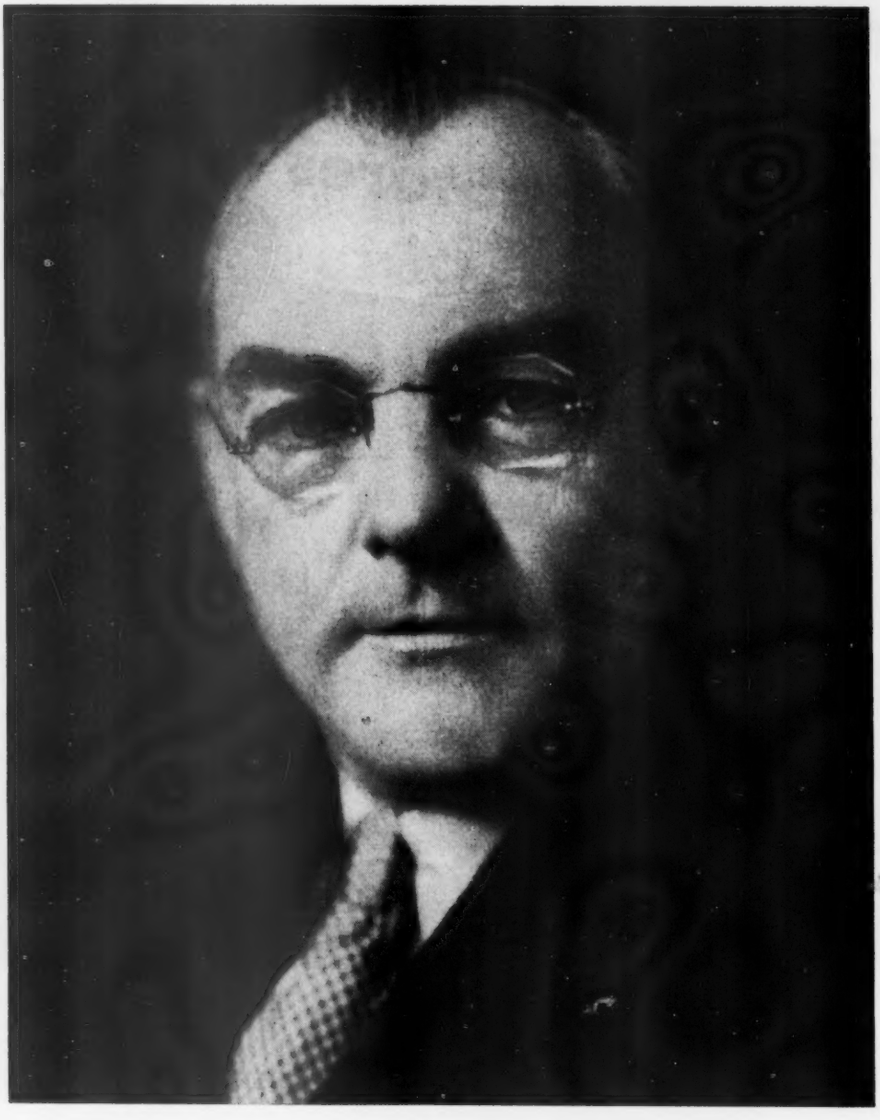

J. W. SAYBOLT

A name which means much in connection with the early days of petroleum technology comes into the news columns again, with the appointment of J. W. Saybolt to the presidency of Penola, Inc., a subsidiary of the Standard Oil Co. (N. J.) specializing in the manufacture of lubricants. His father, George M. Saybolt, was the inventor of some of the oil testing apparatus the industry uses today and served a long period of usefulness with the New Jersey Standard. He was once referred to, at a testimonial dinner, as the "nestor of petroleum technologists of the world."

The son began his career in an oil company laboratory also. He became head of the lubrication division of the New Jersey Standard in 1927. In addition to heading Penola, he is director of the Standard of New Jersey and director and vice-president of the Standard of Pennsylvania and Esso, Inc.